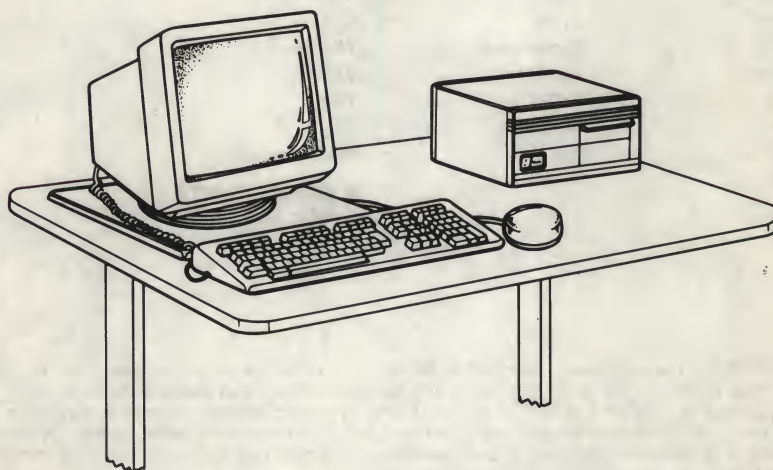


# **VAXstation 2000 Hardware Installation Guide**

Order Number EK-VAXAC-IN-003

**Read this guide first to install and test the VAXstation 2000 hardware.**



**digital equipment corporation  
maynard, massachusetts**

December 1986  
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# Preface

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**Note:** Read this guide first to install and test the VAXstation 2000 hardware.

This guide describes how to prepare your site; connect the monochrome and color monitors, keyboard, pointing device, and options (printers, plotter, modems, and expansion boxes) to the VAXstation 2000 system unit; connect the power cords; power up and test the VAXstation 2000; *format the fixed disk*; and set the default boot device.

Keep this guide for future reference.

## Recommended Reading Path

Read the VAXstation 2000 hardware and operating system software documentation in the following order:

1. Hardware Installation Information
  - a. *VAXstation 2000 Hardware Installation Guide*
  - b. *Workstations and MicroVAX 2000 Network Guide*
2. Operating System Installation Information
  - a. *VAXstation 2000 Owner's Manual*, Chapter 1 (Operating the VAXstation 2000)
  - b. *MicroVMS VAXstation 2000/MicroVAX 2000 Installation Guide*  
or  
*ULTRIX-32W Basic Installation Guide for the VAXstation 2000*
3. Reference Information
  - a. *VAXstation 2000 Owner's Manual*
  - b. *MicroVMS VAXstation 2000/MicroVAX 2000 Operations Guide*

## Procedures

When you go through this guide, you will perform the following procedures. Follow each step sequentially. Do not skip any steps.

1. Site-preparation review
2. Check your shipment
3. Set up the system unit
4. Connect the monitor cable to the system unit
5. Set up the monitor
6. Connect the keyboard to the monitor
7. Connect the pointing device to the monitor
8. Install any options
9. Connect the power cords
10. Power up and test the VAXstation 2000
11. Format any fixed disks
12. Set the default boot device

After all the steps above have been completed, install the networking hardware and install the operating system software.

### Special Notices

The following notices appear throughout this guide:

- Notes — Contain general or supplemental information about a topic.
- Cautions — Contain information to prevent damage to equipment.
- Warnings — Contain information to prevent personal injury.

### Conventions Used in This Guide

Convention	Meaning
<b>Bold</b>	Notes, cautions, and warnings are bolded. User input is also bolded.
<i>Italics</i>	Computer terms defined in the Glossary are italicized the first time the word appears in the text.



## Site-preparation Review

Before installing the VAXstation 2000, review the following site-preparation requirements.

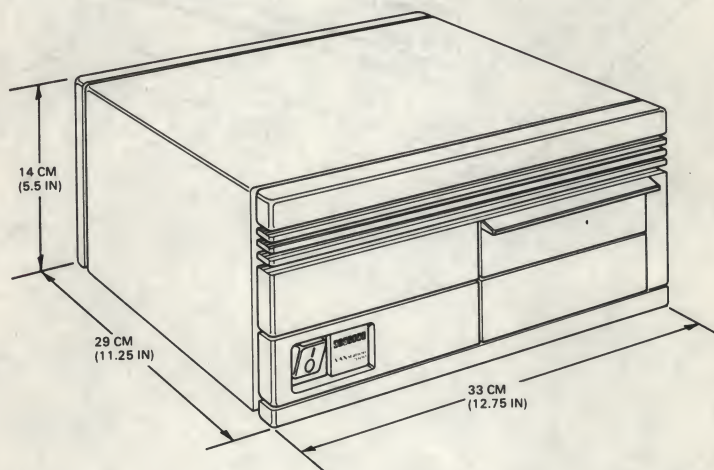
For detailed VAXstation 2000 *system* specifications, refer to Appendix A of the *VAXstation 2000 Owner's Manual*.

## Space Planning

Plan for 10 cm (4 in) clearance on all sides of the VAXstation 2000 system unit and monitor to allow air circulation through the equipment. Do not block the vents.

The VAXstation 2000 system unit (Figure 1) weighs about 12.7 kg (28 lb).

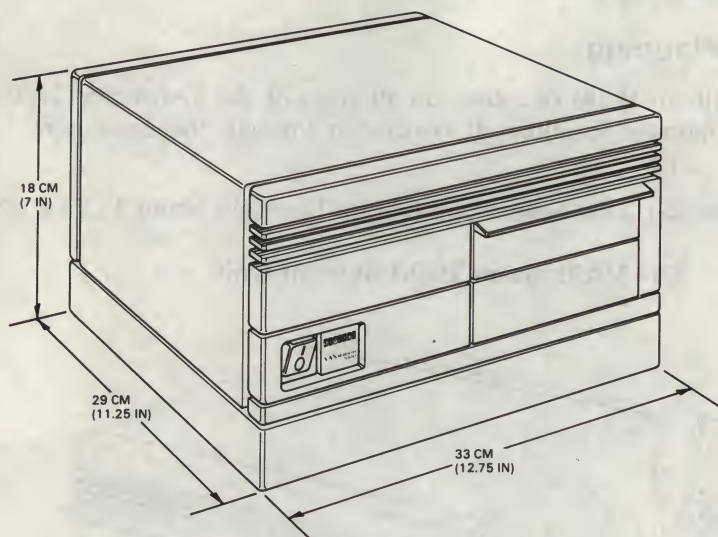
**Figure 1: The VAXstation 2000 System Unit**



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The VAXstation 2000 system unit with the expansion adapter (Figure 2) weighs about 14 kg (30 lb).

**Figure 2: The VAXstation 2000 System Unit with the Expansion Adapter**

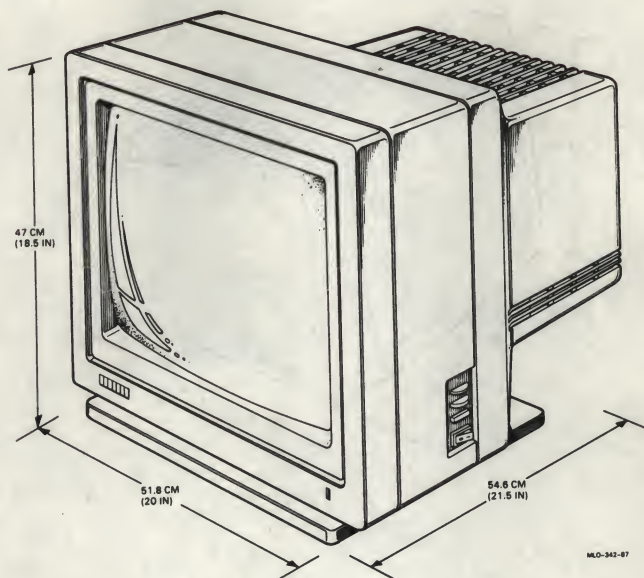


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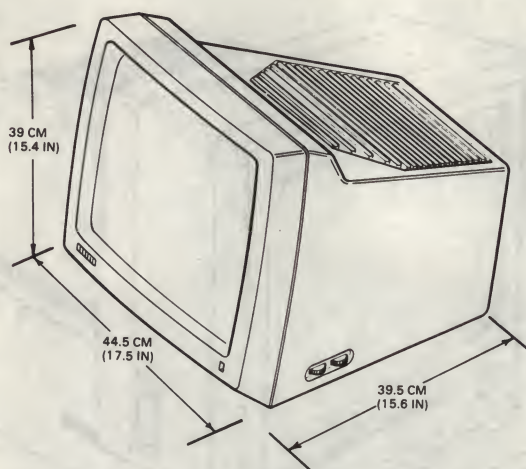
The VR290 color monitor in Figure 3 weighs 36 kg (80 lb).

**Figure 3: The VR290 Color Monitor**



The VR260 monochrome monitor in Figure 4 weighs 18 kg (40 lb).

**Figure 4: The VR260 Monochrome Monitor**

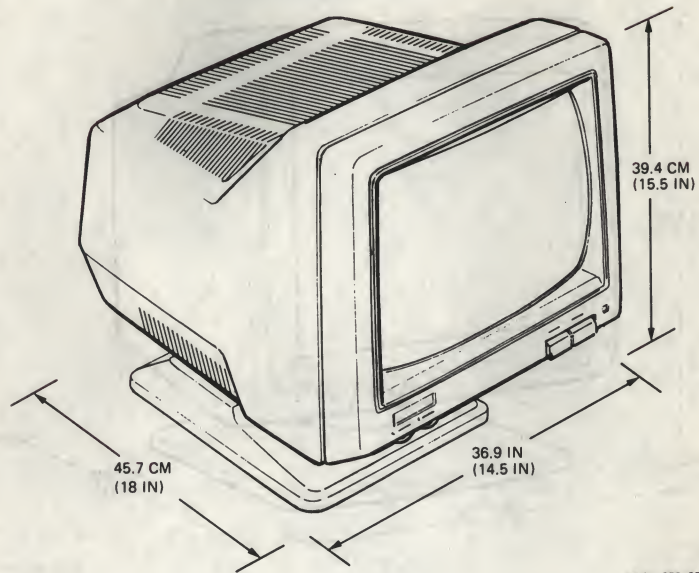


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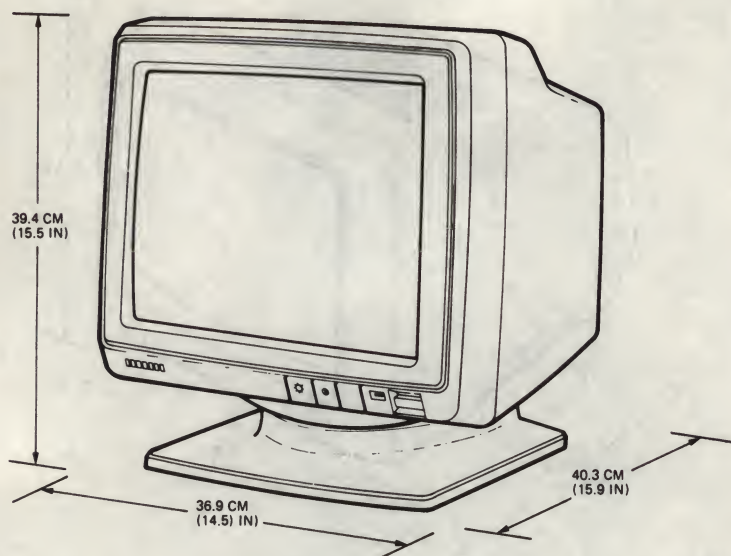
The VR160 color monitor in Figure 5 weighs 23 kg (51 lb).

**Figure 5: The VR160 Color Monitor**



The VR150 monochrome monitor in Figure 6 weighs 16.34 kg (36 lb).

**Figure 6: The VR150 Monochrome Monitor**





## Environmental Requirements

- Keep environment between 15.5 and 35.5 degrees Celsius (60 and 96 degrees Fahrenheit).
- Keep the air well circulated to prevent heat from accumulating.
- Keep the VAXstation 2000 away from heaters, photocopiers, and direct sunlight.
- Keep environment between 40 and 80 percent relative humidity for proper operation of the VAXstation 2000.
- To decrease static electricity buildup, locate the system away from busy areas, such as office corridors, and keep the environment at the recommended humidity levels. (Static electricity can cause a system to fail, *data* to be lost, and other problems to occur.)
- Keep the area clean. Do not place food or liquid on or near the VAXstation 2000.
- Keep the area free of dust. Filter the air. (Dust particles can interfere with system cooling and damage *hardware*, *diskettes*, and tape cartridges.)
- Store supplies, such as diskettes and tape cartridges, at the same temperature and humidity levels as recommended for the system environment. (Refer to the *VAXstation 2000 Owner's Manual* for more information on diskettes and tape cartridges.)

## Electrical Requirements

A dedicated 15-ampere branch circuit is recommended for each system. The circuit must meet national and local standards, provide a good system ground, be stable, and be free from electrical noise. If power disturbances cannot be prevented, add power-conditioning equipment. Some *printers* require branch circuits. Consult DIGITAL service personnel to assess your needs.

The ac power source should allow for system expansion. Do not connect other equipment (such as air conditioners or office copiers) to the circuit dedicated to the system unit or the monitor.

## Check Your Shipment

The basic VAXstation 2000 hardware shipment consists of two cartons: the VAXstation 2000 system unit carton and the consolidation carton. Check your shipment to see that you have received all the items in Figure 7. You will receive one monitor from those shown in Figure 8 and all of the other hardware. Optional items and *software* are not depicted. (The packing slip should also list all the items you have received. Keep the packing slip. The serial number of the fixed *disk* is on the packing slip. You will need this serial number to format the fixed disk.)

**Note:** If you have a diskless system, you will receive an RD/RX cable with screws. Keep this cable and screws for future upgrade to a system with a disk.

**Caution:** The cable-restraining bar on the rear of the VAXstation 2000 system unit can be used as a handle and should be used to carry the system unit. However, do not place the VAXstation 2000 system unit on its front, as it may damage the drive door on the front of the system unit.



**Figure 7: VAXstation 2000 System Unit Carton Contents**



**VAXstation 2000  
SYSTEM UNIT**



**VAXstation 2000  
POWER CORD**



**FLAT BLADE  
SCREWDRIVER**



**T-CONNECTOR**



**TERMINATOR (2)**



**BOTTOM  
DRESS COVER**



**MONOCHROME MONITOR BC18P  
VIDEO CABLE  
ASSEMBLY**



**COLOR MONITOR BC19S  
VIDEO CABLE ASSEMBLY**

**HARDWARE INFORMATION KIT**



**VAXstation 2000  
HARDWARE INSTALLATION  
GUIDE (THIS GUIDE)**



**VAXstation 2000  
OWNER'S MANUAL**



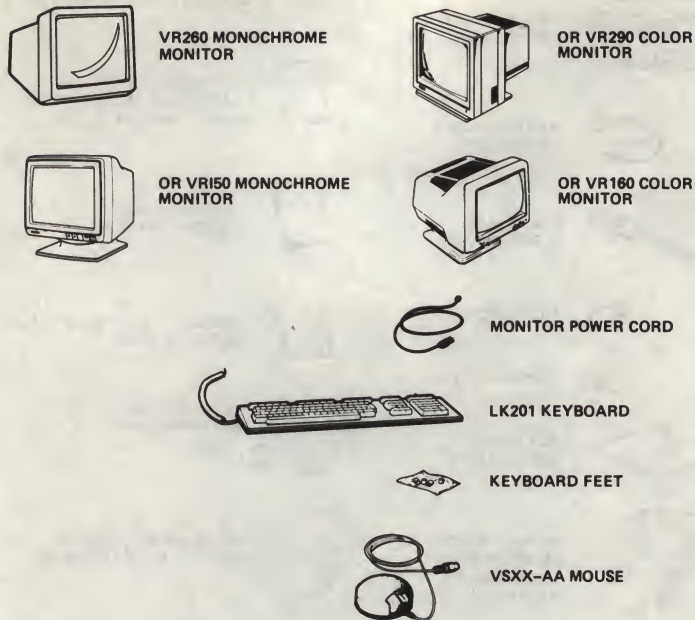
**Workstations and MicroVAX 2000  
NETWORK GUIDE**



**INTERMEDIARY  
ETHERNET CABLE**

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**Figure 8: VAXstation 2000 Consolidation Carton Contents**



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You may also have received additional items. If you ordered *operating system* software, it is contained in a separate software carton along with the operating system documentation. Certain hardware options, such as printers, a tilt-swivel base for the VR260 monochrome monitor (order number VR10X-AA), the *tablet*, or expansion boxes, are also packaged in separate boxes. Other options, such as the expansion adapter and *memory module*, come preinstalled on or in the system unit.

If your shipment is damaged or if any item that you ordered is missing, inform the delivery agent and contact your sales representative.

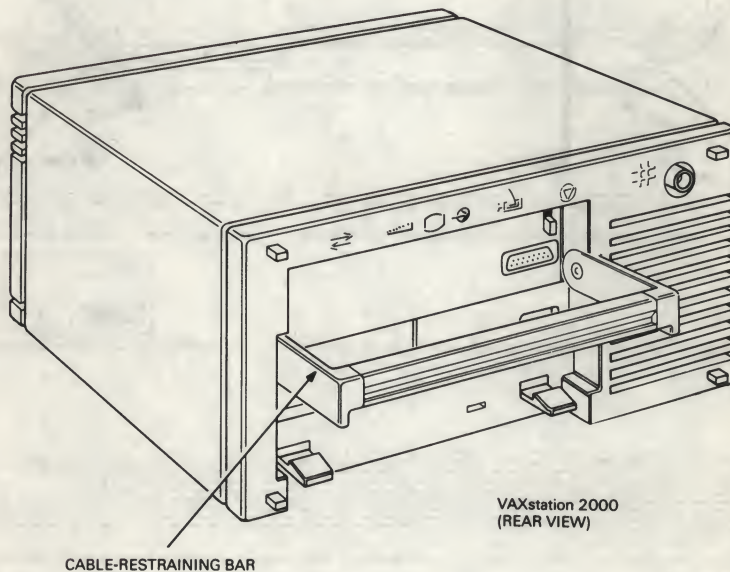
Save all packing boxes in case you change locations or need to send back parts of the system for repair.



## Set Up the System Unit

**Caution:** The cable-restraining bar on the rear of the VAXstation 2000 system unit (Figure 9) can be used as a handle and should be used to carry the system unit. However, do not place the VAXstation 2000 system unit on its front, as it may damage the drive door on the front of the system unit.

**Figure 9: Cable-restraining Bar**



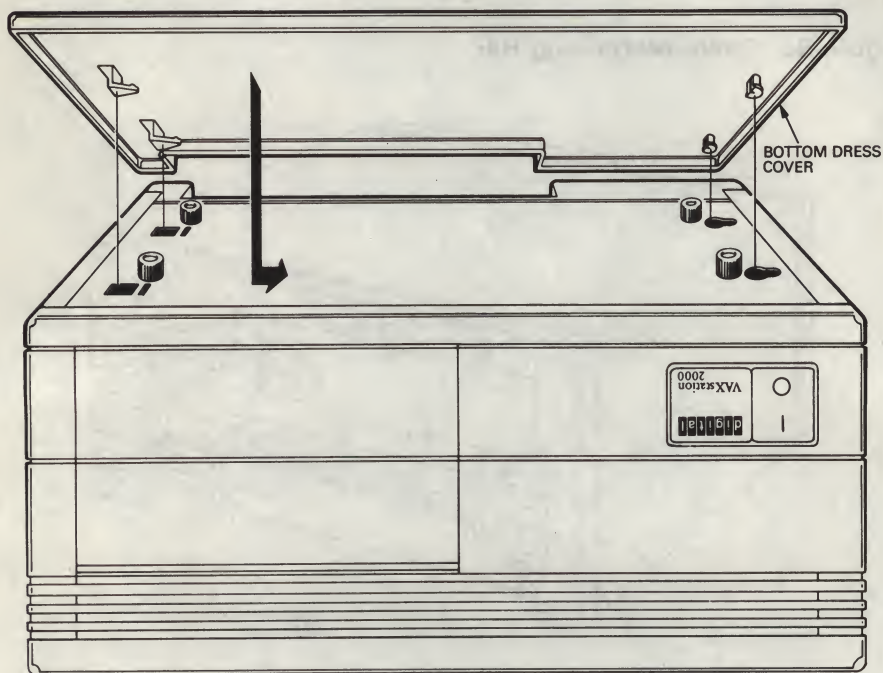
1. You may set up the VAXstation 2000 system unit on its bottom rubber feet or on its side (either side).

If you choose to set up the VAXstation 2000 system unit on its side, you should first install the bottom dress cover. To install the bottom dress cover, do the following:

- a. Place the VAXstation 2000 system unit upside down on a level surface.
- b. Locate the bottom dress cover.

- c. Line up the molded inserts on the inside of the bottom dress cover over the holes on the bottom of the VAXstation 2000 system unit. Then slide the bottom dress cover until it locks into place (Figure 10).

**Figure 10: Bottom Dress Cover on System Unit**



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2. Place the VAXstation 2000 system unit in either of the recommended positions on a level surface. (All the illustrations in this guide show the VAXstation 2000 system unit positioned on its feet. If you wish to position the system unit on its side, follow the text and use the illustrations for cabling installation reference.)



## Connect the Monitor Cable to the System Unit

The VR290 and VR160 color monitors use the BC19S color video cable. The VR260 and VR150 monochrome monitors use the BC18P video cable.

However, if you have a VR260 or VR150 monochrome monitor with a 4-plane *graphics coprocessor* for *gray-scale* display on your screen, use the color video cable assembly (part no. BC19S).

**Caution:** When installing the cables into the rear of the VAXstation 2000 system unit, do not place the system unit on its front, as it may damage the drive door.

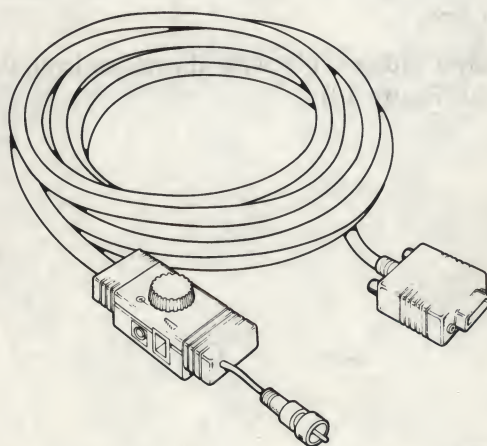
**Caution:** Never disconnect or connect the video cable to the system unit while the power is on.

1. Lift up the cable-restraining bar on the rear of the VAXstation 2000 system unit.

**Note:** If you are going to connect the printer and modem cables, leave the cable-restraining bar up until you have connected those options.

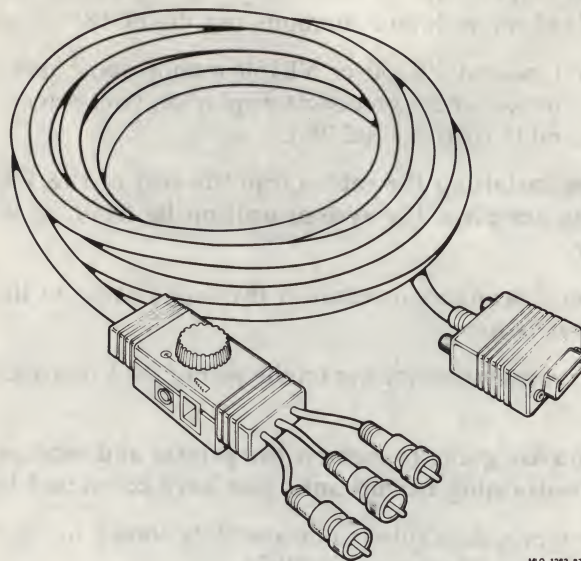
2. Locate the appropriate video cable assembly shown in Figure 11 (part no. BC18P) or Figure 12 (part no. BC19S).

**Figure 11: Video Cable Assembly, BC18P**



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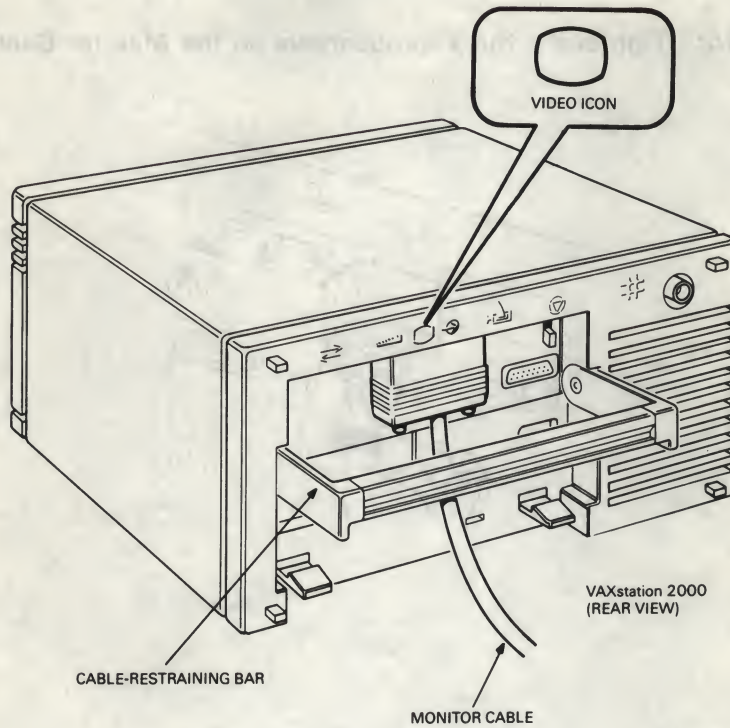
**Figure 12: Color Video Cable Assembly, BC19S**



3. Connect the end of the appropriate video cable to the video *port* on the rear of the VAXstation 2000 system unit. The video port is identified with the video icon.
4. Insert the monitor video cable with the video-icon side of the monitor cable facing you (Figure 13).

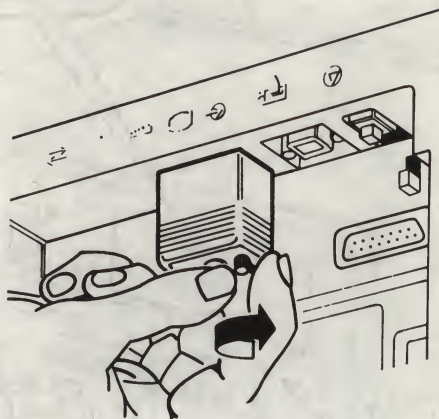


**Figure 13: Connecting the Monitor Cable to the System Unit**



5. Tighten the thumbscrews on the monitor video cable by turning them clockwise with your fingers (Figure 14).

**Figure 14: Tightening the Thumbscrews on the Monitor Cable**



MLO-1351-87



## **Install the Monitor**

### **Avoid damage to your diskettes.**

The electromagnetism from your monitor may damage diskettes by distorting or erasing the magnetic patterns. Do not place any magnetic media on or near your monitor.

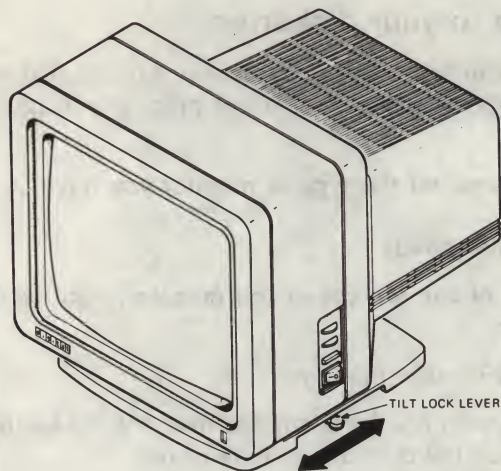
Follow the instructions for the type of monitor you have.

### **VR290 Color Monitor**

**Caution:** Because of the weight of the monitor, you need two people to move the monitor.

1. Locate the VR290 color monitor.
2. Place the monitor on a level surface near the VAXstation 2000 system unit and position the monitor for ease of use.
3. Adjust the monitor to a position you find comfortable. To tilt the monitor:
  - a. Slide the tilt-lock lever (Figure 15) away from you (toward the back of the monitor) to unlock the monitor from the base.

**Figure 15: Tilt-lock Lever, VR290 Color Monitor**



- b. Tilt the monitor to the desired position.
- c. Slide the lever toward you to lock the monitor in place.

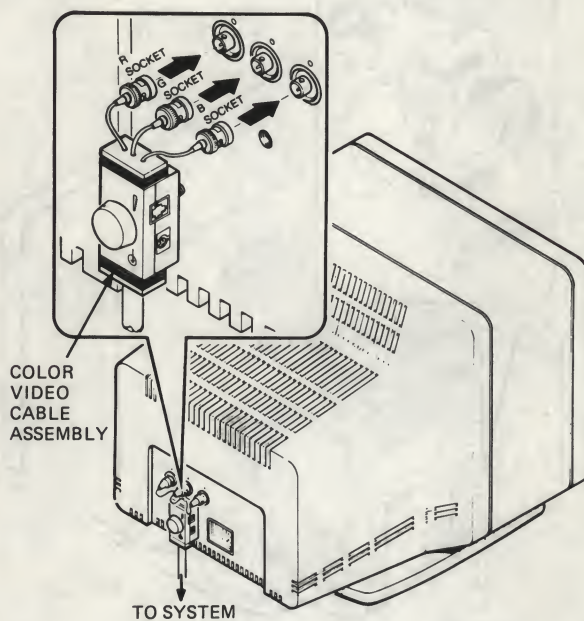


### Install Video Cable Assembly, VR290 Color Monitor

The color video cable assembly comes with two different length knobs to attach the video cable assembly to the monitor. The longer knob is for the VR290 color monitor. The shorter knob is for the VR150 monochrome monitor with gray-scale capabilities.

1. Insert the connectors of the R, G, and B video cables into the corresponding R, G, and B sockets on the back of the monitor (Figure 16). Turn each connector clockwise to fasten.

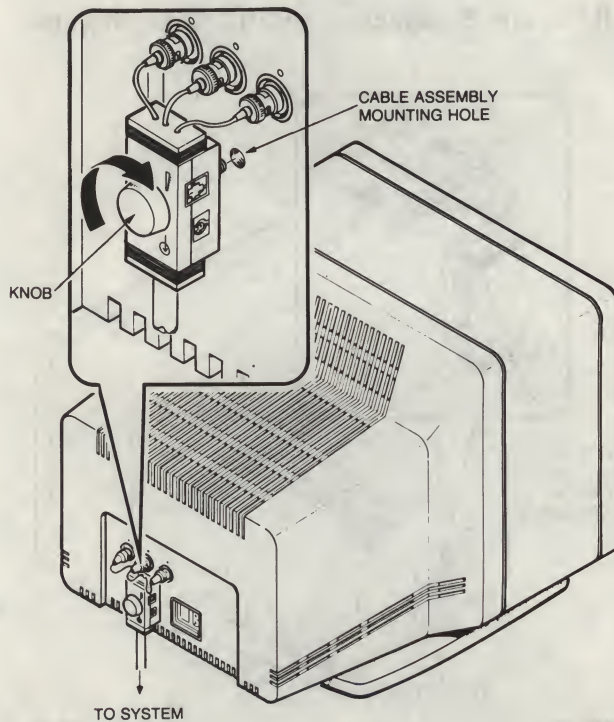
**Figure 16: R, G, and B, Sockets, VR290 Color Monitor**



MLO-1265-87

2. Locate the longer knob of the two knobs that come with the color video cable.
3. Insert the knob into the color video cable assembly.
4. Turn the knob (Figure 17) on the video cable assembly clockwise to secure it to the monitor.

**Figure 17: Video Cable Assembly Knob, VR290 Color Monitor**



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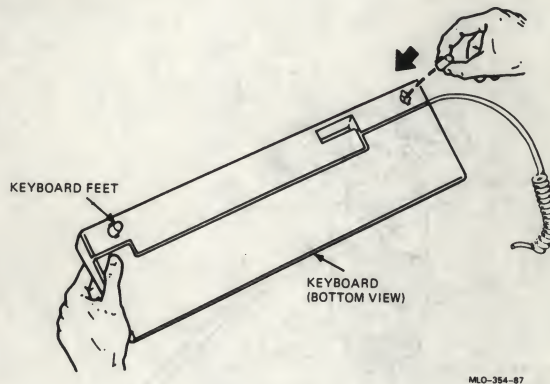
**Note:** The voltage level on the color monitor is set at the factory; therefore, you do not need to reset it.



### Connect the Keyboard to the VR290 Color Monitor

1. Locate the keyboard.
2. Turn the keyboard over and install the keyboard feet (Figure 18). Installation of the keyboard feet is optional.

**Figure 18: Installing the Keyboard Feet, VR290 Color Monitor**

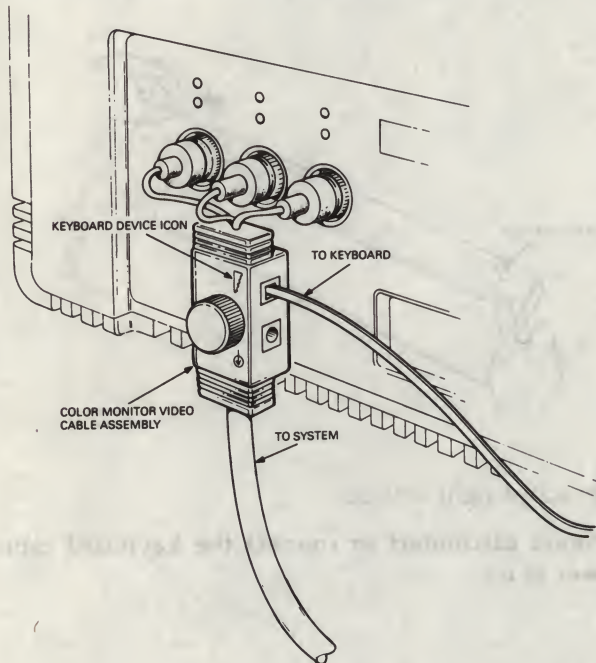


3. Turn the keyboard right side up.

**Caution: Never disconnect or connect the keyboard cable while the system power is on.**

4. Connect the free end of the keyboard cable to the video cable assembly on the rear of the monitor. Figure 19 shows the keyboard connected to the VR290 color monitor. The connection on the video cable assembly is identified with a keyboard *device icon*.

**Figure 19: Keyboard Connection, VR290 Color Monitor**



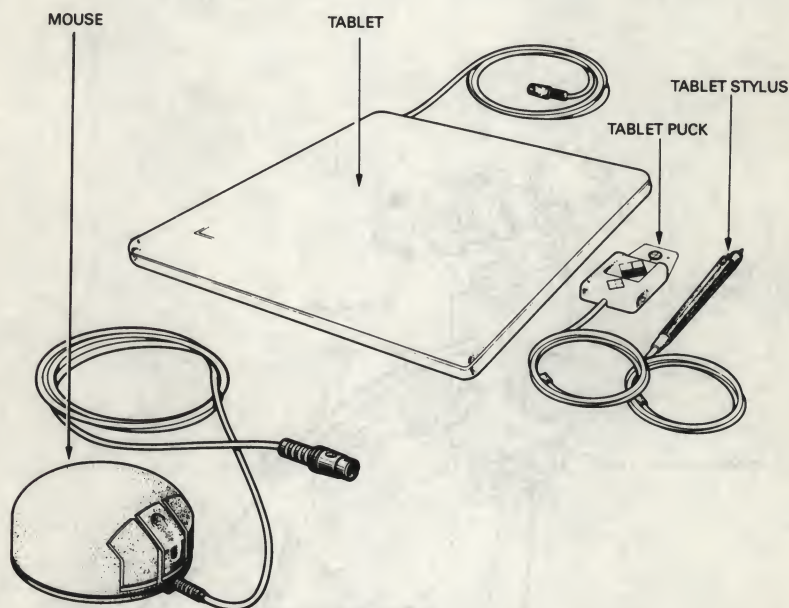
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## Connect the Pointing Device to the VR290 Color Monitor

1. Locate the *pointing device* you wish to use, which may be either a *mouse* (standard) or a *tablet* (optional) (Figure 20). The mouse and the tablet cannot be used at the same time.

**Figure 20: Mouse and Tablet, VR290 Color Monitor**



MLO-367-87

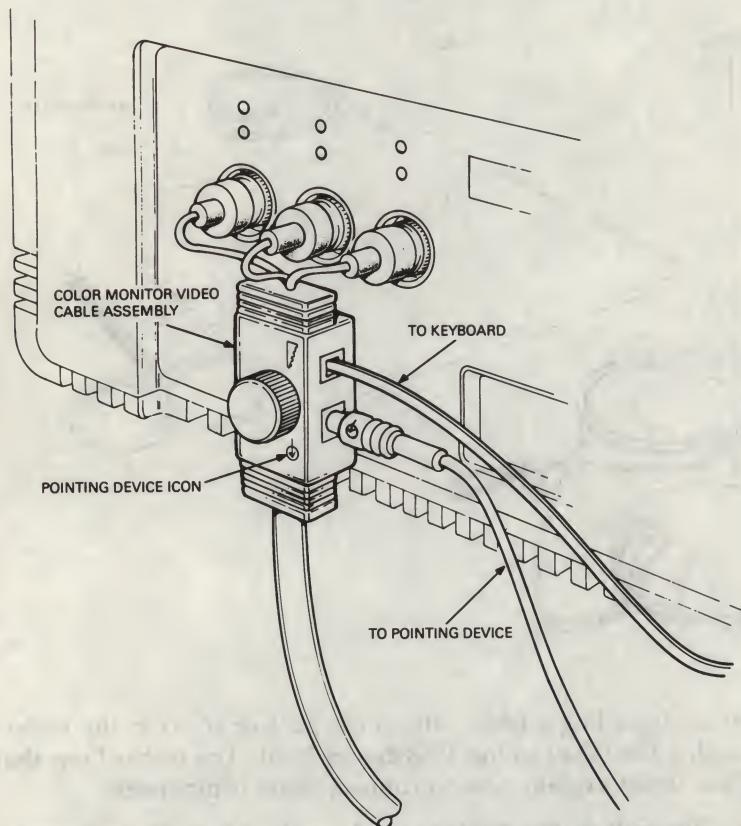
2. If you are installing a tablet, attach the *puck* or *stylus* to the tablet before connecting the tablet to the VAXstation 2000. The instructions that come with the tablet explain how to connect those components.

**Note:** To switch the tablet's puck and stylus, first disconnect the tablet from the VAXstation 2000, then swap the puck or stylus, and reconnect the tablet to the system.

**Caution:** Never disconnect or connect the pointing device cable while the system power is on.

3. Connect the free end of the pointing device cable into the video cable assembly (Figure 21). The connection on the video cable assembly is labeled with a pointing device icon.

**Figure 21: Pointing Device Connection, VR290 Color Monitor**





## VR260 Monochrome Monitor

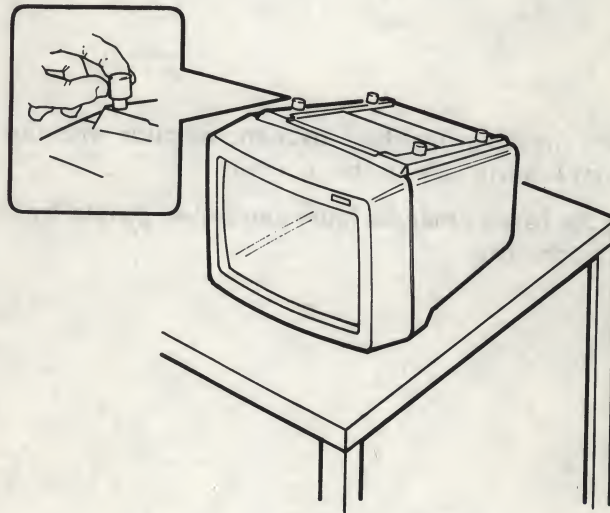
**Caution:** Because of the weight of the monitor, you need two people to move the monitor.

1. Locate the VR260 monochrome monitor.
2. To set up the monitor without the tilt-swivel base, place the monitor right side up on a level surface near the VAXstation 2000 system unit and position the monitor for ease of use.

If you have an optional tilt-swivel base for the monitor, do the following to set it up:

- a. Place the monitor upside down on a level surface.
- b. Loosen the monitor feet by turning them counterclockwise (Figure 22).

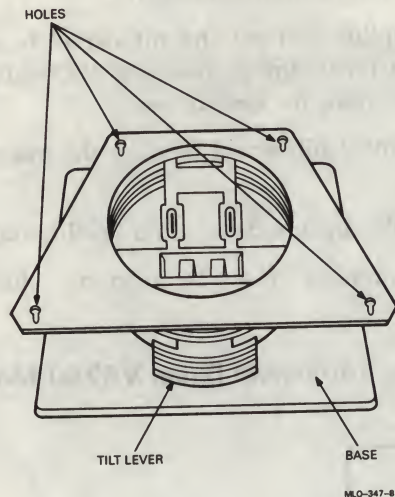
**Figure 22: Installing Tilt-swivel Base, VR260 Monochrome Monitor**



MLO-348-87

- c. Locate the tilt-swivel base (Figure 23).

**Figure 23: Tilt-swivel Base, VR260 Monochrome Monitor**

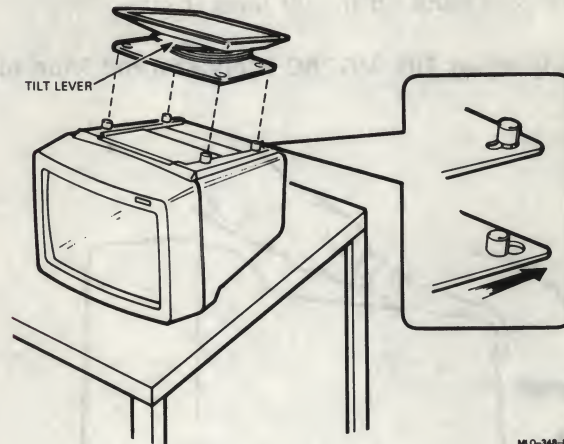


- d. Position the tilt-swivel base over the monitor with the tilt lever on the front (screen) side of the monitor.
- e. Lower the base so that the four monitor feet go into the corresponding holes on the base.



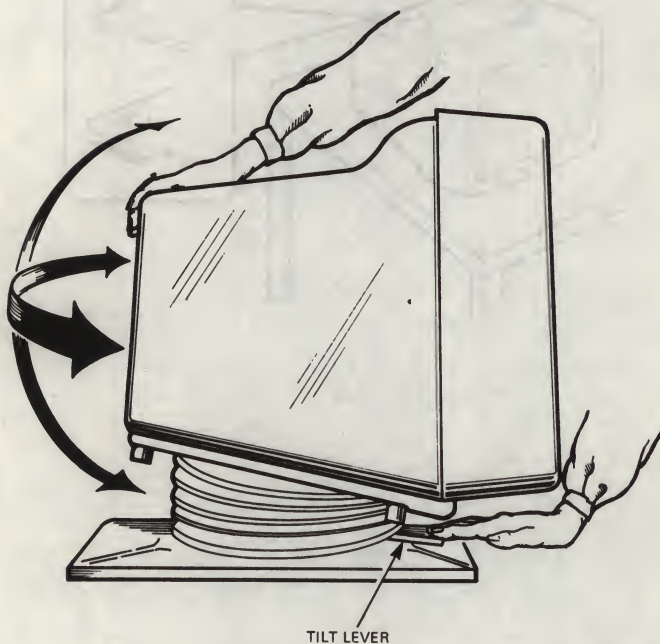
- f. Pull the base toward the back of the system until the base slides and locks in place (Figure 24).

**Figure 24: Locking Tilt-swivel Base in Place, VR260 Monochrome Monitor**



- g. Tighten the monitor feet.
- h. Place the monitor right side up on a level surface near the VAXstation 2000 and position the monitor for ease of use.
- i. To adjust the tilt of the monitor, press the tilt lever down and move the monitor to the desired angle. The monitor locks into place when you take your hand off the tilt lever (Figure 25).

**Figure 25: Adjusting Tilt, VR260 Monochrome Monitor**



MLO-349-87

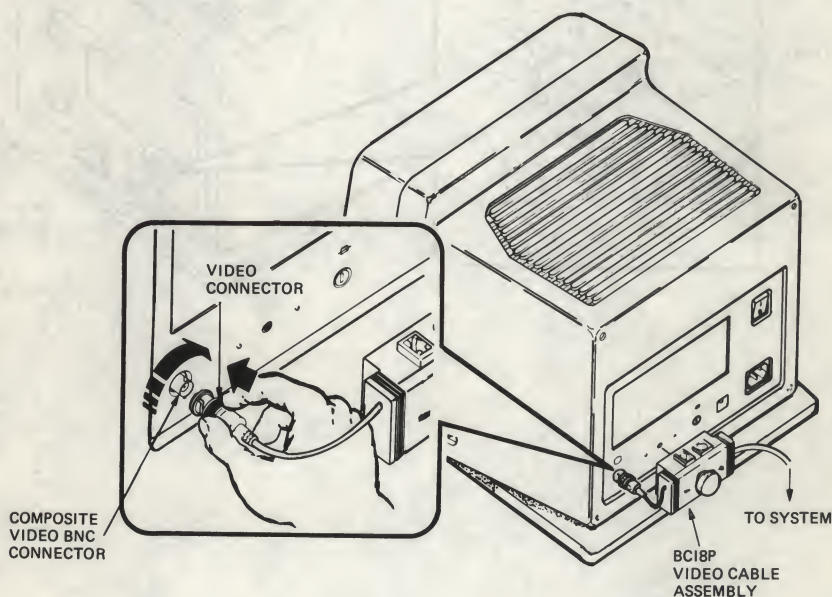
### **Install Video Cable Assembly, VR260 Monochrome Monitor**

If you have a VR260 monochrome monitor with a 4-plane graphics coprocessor to display gray-scale on your screen, you will need to install a color video cable assembly on your VR260 monitor. Follow the instructions in the section, VR260 Monochrome Monitor with 4-plane Graphics Coprocessor to install the color video cable assembly on your monochrome monitor.

### **VR260 Monochrome Monitor Without 4-plane Graphics Coprocessor**

1. Insert the video connector into the socket on the back of the monitor. Turn the connector clockwise to fasten (Figure 26).

**Figure 26: Fastening the Video Connector, VR260 Monochrome Monitor**

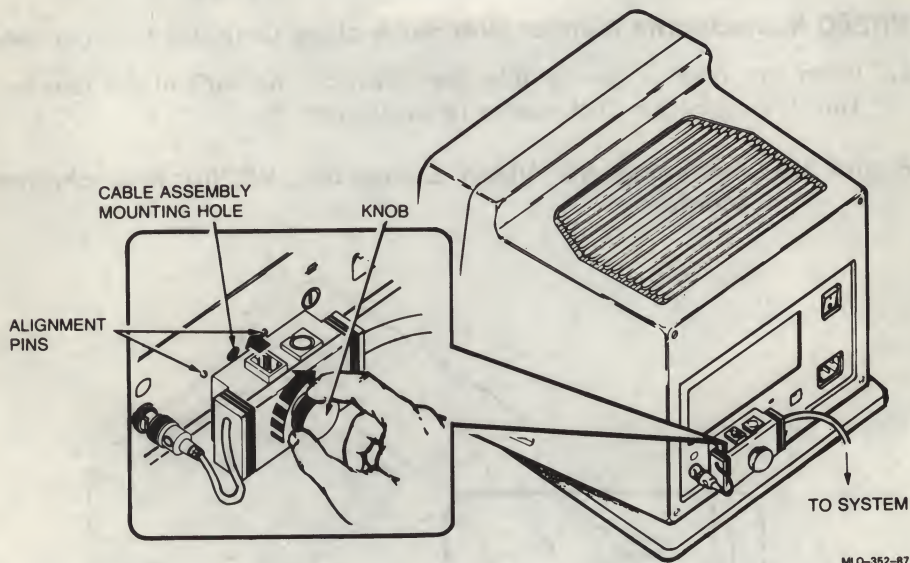


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2. Insert the pins and the knob of the video cable assembly into the holes to the right of the video connector on the rear of the monitor. Turn the knob clockwise to screw in the video cable assembly (Figure 27).

**Figure 27: Connecting Video Cable Assembly to VR260 Monochrome Monitor**



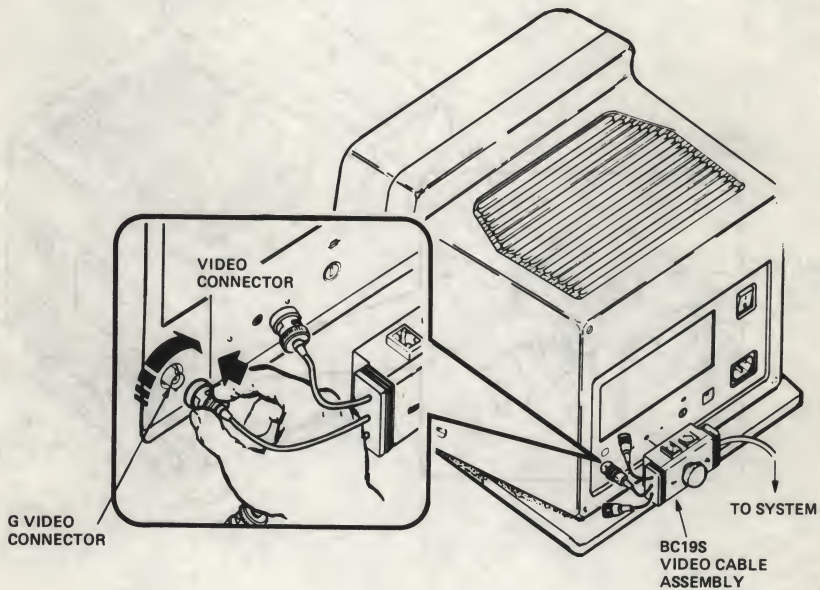
MLO-352-87

### VR260 Monochrome Monitor with 4-plane Graphics Coprocessor

1. Insert **ONLY** the G video cable connector of the color video cable assembly (BC19S) into the socket on the back of the monitor (Figure 28).
2. Turn the connector clockwise to fasten.

**Note:** The R and B connectors will hang freely — do not connect them to anything.

**Figure 28: Connecting G Cable Connector of the Color Cable, VR260 Monochrome Monitor**

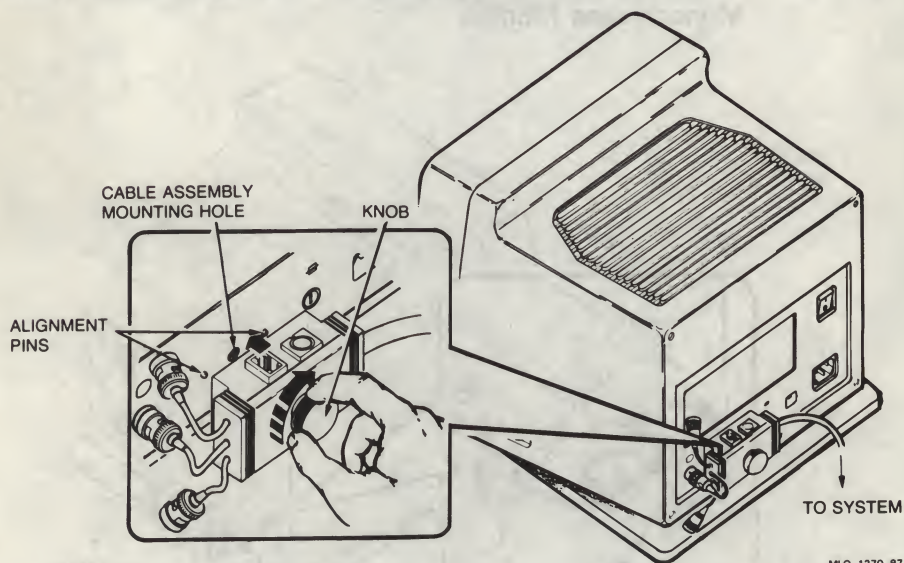


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3. Locate the shorter knob of the two knobs that come with the color video cable.
4. Insert the knob into the color video cable assembly.
5. Turn the knob (Figure 29) on the video cable assembly clockwise to secure it to the monitor.

**Figure 29: Video Cable Assembly Knob**

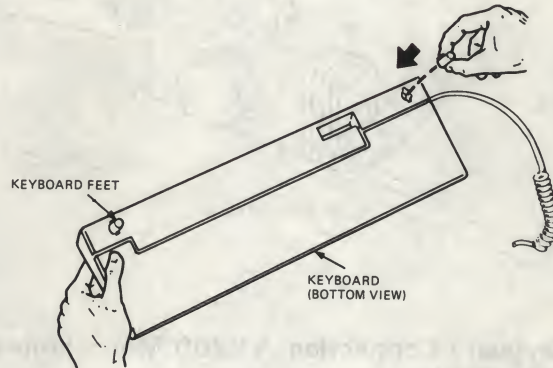




## Connect the Keyboard to the VR260 Monochrome Monitor

1. Locate the keyboard.
2. Turn the keyboard over and install the keyboard feet (Figure 30). Installation of the keyboard feet is optional.

**Figure 30: Installing the Keyboard Feet, VR260 Monochrome Monitor**



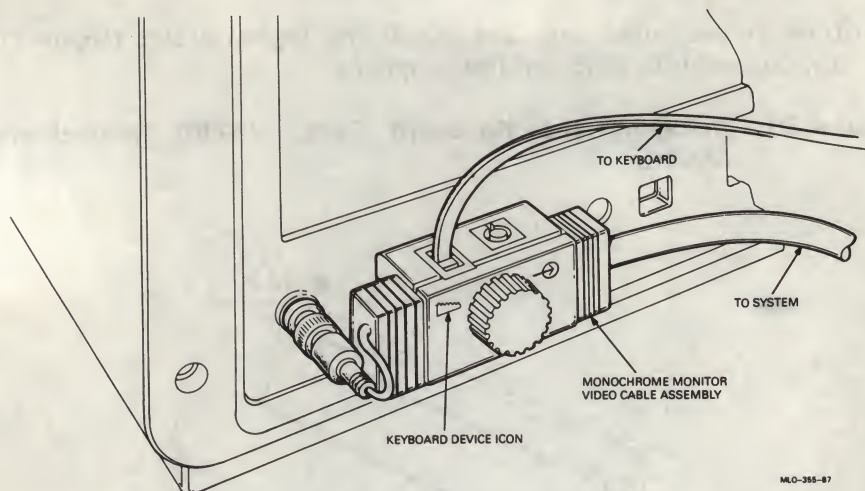
3. Turn the keyboard right side up.

**Caution: Never disconnect or connect the keyboard cable while the system power is on.**

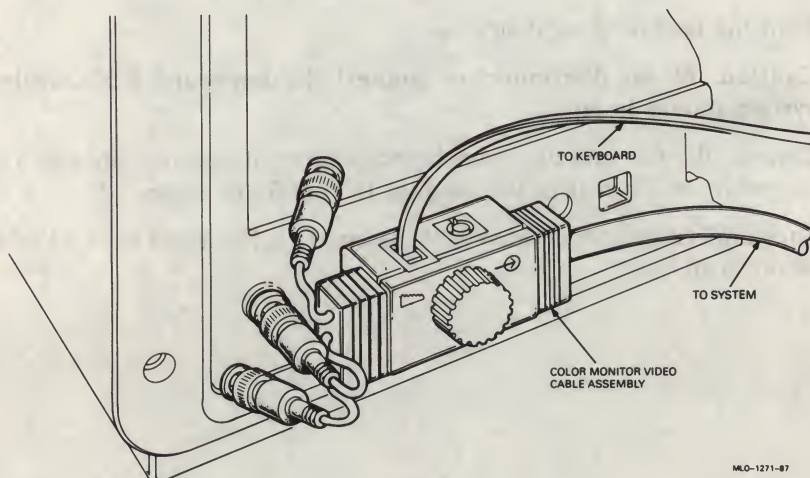
4. Connect the free end of the keyboard cable to the appropriate video cable assembly on the rear of the monitor (Figure 31 or Figure 32).

The connection on the video cable assembly is identified with a keyboard device icon.

**Figure 31: Keyboard Connection, VR260 Monochrome Monitor**



**Figure 32: Keyboard Connection, VR260 Monochrome Monitor and Color Cable**

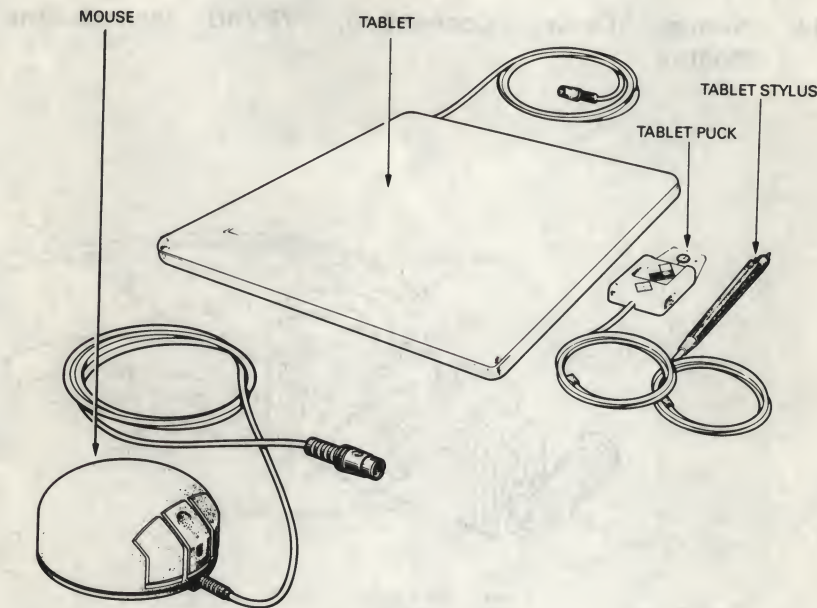




## Connect the Pointing Device to the VR260 Monochrome Monitor

1. Locate the pointing device you wish to use, which may be either a mouse (standard) or a tablet (optional) (Figure 33). The mouse and the tablet cannot be used at the same time.

**Figure 33: Mouse and Tablet, VR260 Monochrome Monitor**



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2. If you are installing a tablet, attach the puck or stylus to the tablet before connecting the tablet to the VAXstation 2000. The instructions that come with the tablet explain how to connect those components.

**Note:** To switch the tablet's puck and stylus, first disconnect the tablet from the VAXstation 2000, then swap the puck or stylus, and reconnect the tablet to the system.

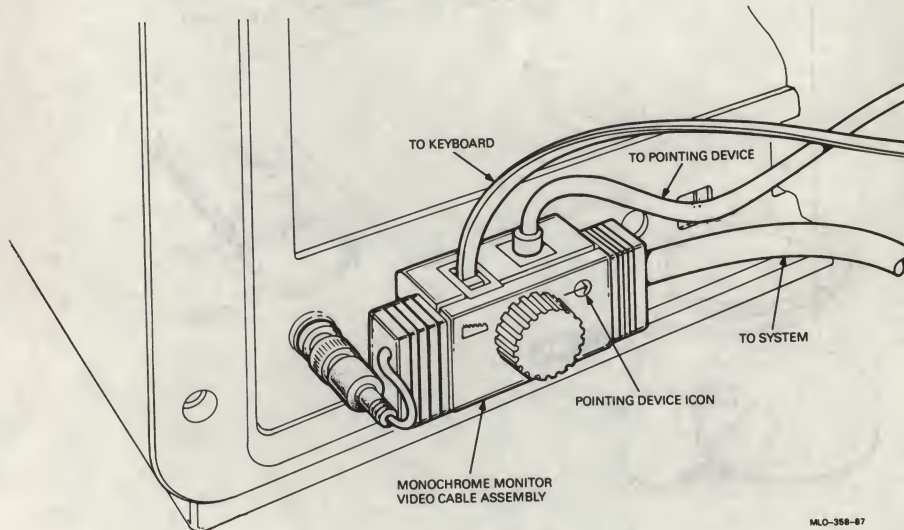


**Caution:** Never disconnect or connect the pointing device cable to the monitor while the system power is on.

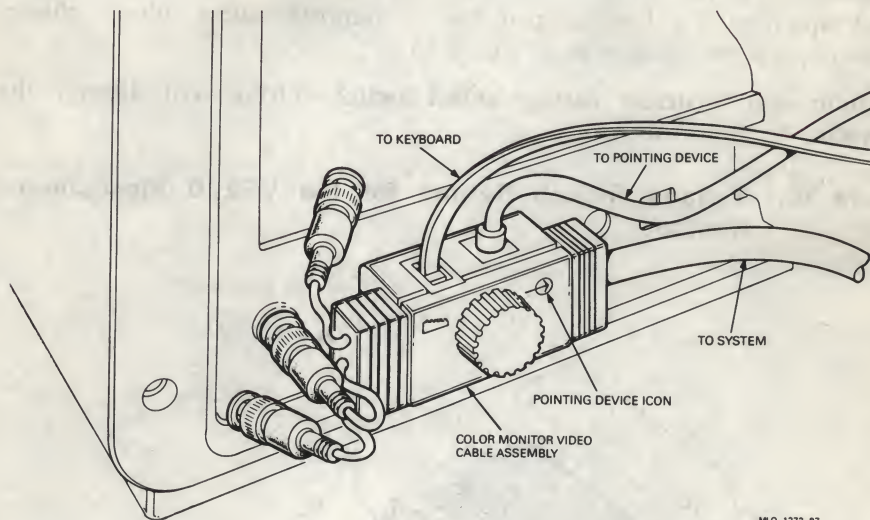
3. Connect the free end of the pointing device cable into the appropriate video cable assembly (Figure 34 or Figure 35).

The connection on the video cable assembly is labeled with a pointing device icon.

**Figure 34: Pointing Device Connection, VR260 Monochrome Monitor**



**Figure 35: Pointing Device Connection, VR260 Monochrome Monitor with Color Cable**



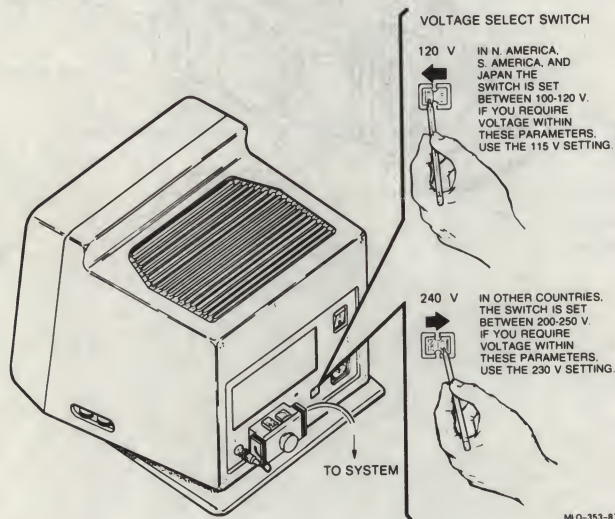
MLO-1272-87

## Set the Voltage, VR260 Monochrome Monitor

DIGITAL has set the voltage select switch on the VR260 monochrome monitor for the country where the monitor will be installed. If the monitor's voltage select switch setting does not match your country's source voltage, change the setting on the monitor as in Figure 36.

**Caution:** An incorrect voltage select switch setting will damage the monitor.

**Figure 36: Voltage Switch Setting for the VR260 Monochrome Monitor**





## VR160 Color Monitor

Place the monitor on a level surface near the VAXstation 2000 system unit (Figure 37).

**Caution:** This procedure requires two people. The monitor weighs 23 kilograms (51 pounds).

**Figure 37: Setting the VR160 on a Level Surface**



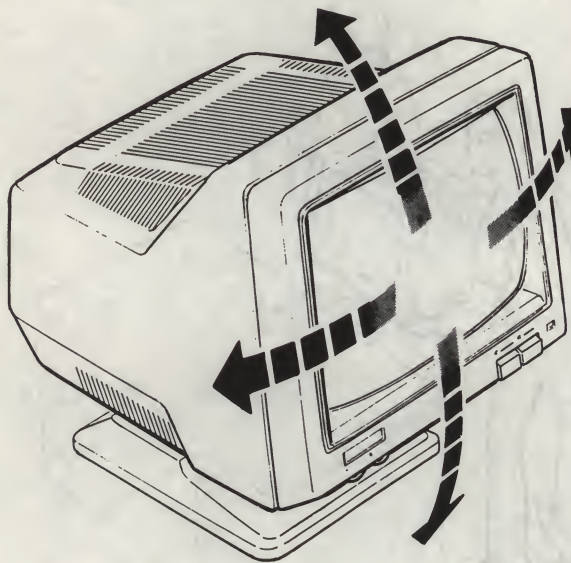
MLO-1355-87

### Adjusting Tilt of VR160 Monitor

**Caution:** The monitor does not swivel in a complete circle. If you try to swivel the monitor in a complete circle, you may damage the base.

To set the angle, tilt the monitor forward or backward to the desired position. You can swivel the monitor about its base and still maintain the tilt angle (Figure 38).

**Figure 38: Adjusting Tilt, VR160 Monitor**



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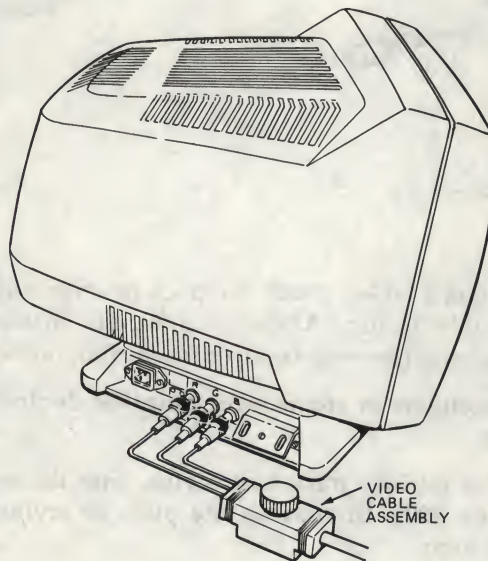
## Install Video Cable Assembly, VR160 Color Monitor

1. Face the rear of the monitor.
2. Swivel the monitor all the way to the left to access the signal cable connectors.
3. Locate the signal cable connectors on the monitor.
4. Connect the signal cables to the monitor (Figure 39) in the following order.

**Note:** Push each cable in and turn each connector clockwise until it clicks and locks in place.

- a. Connect the blue signal cable to the connector labeled B.
- b. Connect the green signal cable to the connector labeled G.
- c. Connect the red signal cable to the connector labeled R.

**Figure 39: Connecting R, G, and B Signal Cables, VR160 Color Monitor**

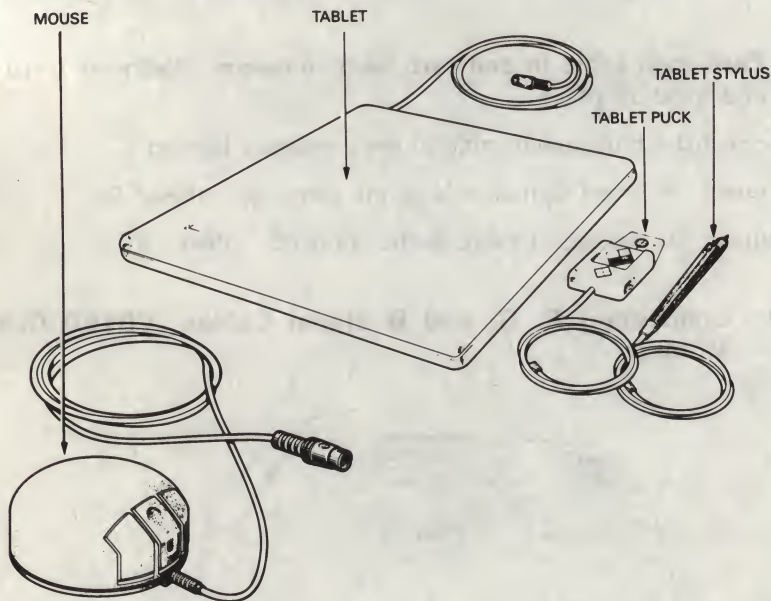




## Set Up the Pointing Device

1. Locate the pointing device you wish to use, which may be either a mouse (standard) or a tablet (optional) (Figure 40). The mouse and the tablet cannot be used at the same time.

**Figure 40: Mouse and Tablet, VR160 Color Monitor**



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2. If you are installing a tablet, attach the puck or stylus to the tablet before connecting the tablet to the VAXstation 2000. The instructions that come with the tablet explain how to connect those components.

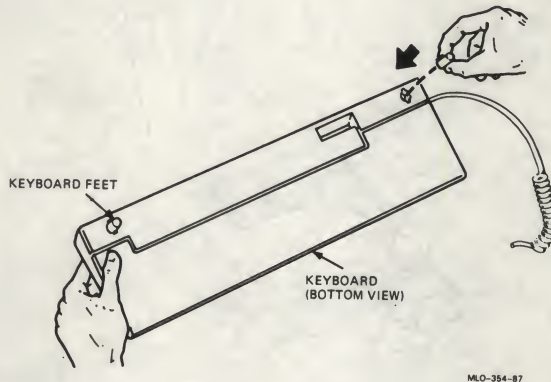
**Caution:** Never disconnect or connect the pointing device cable while the system power is on.

**Note:** To switch the tablet's puck and stylus, first disconnect the tablet from the VAXstation 2000, then swap the puck or stylus, and reconnect the tablet to the system.

## Installing the Keyboard and Pointing Device

1. Locate the keyboard.
2. Turn the keyboard over and install the keyboard feet (Figure 41). Installation of the keyboard feet is optional.

**Figure 41: Installing the Keyboard Feet, VR160 Color Monitor**



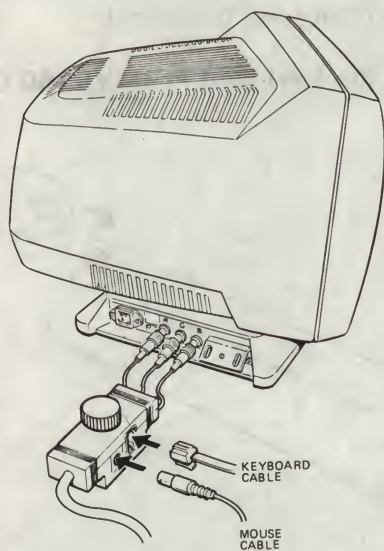
3. Turn the keyboard right side up.

**Caution: Never disconnect or connect the pointing device cable while the system power is on.**

4. Connect the keyboard cable and pointing device cable to the video cable assembly (Figure 42).

The connection on the video cable assembly is identified with a keyboard device icon and pointing device icon.

**Figure 42: Connecting the Keyboard Cable and Pointing Device**



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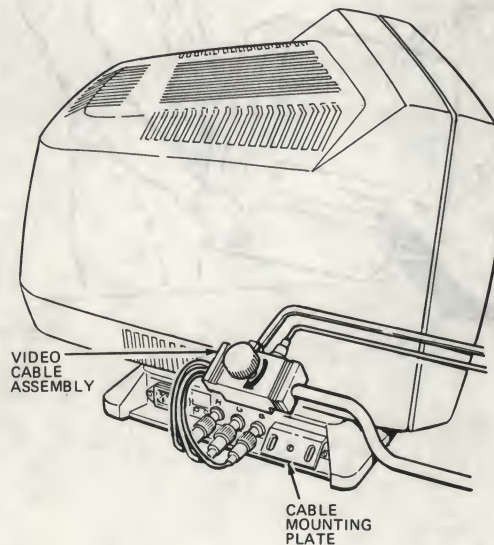


### Mount Video Cable Assembly to VR160 Monitor

1. Locate the shorter knob of the two knobs that comes with the color video cable.
2. Screw the video cable assembly into the cable mounting plate.
3. Turn the knob until it is tight (Figure 43).
4. Make sure the video cable assembly is flat against the cable mounting plate when you start and finish securing the cable to the monitor.

**Caution:** Failure to secure the video cable assembly screw to the cable mounting plate may strain the cable and may also cause radio emissions in excess of FCC guidelines.

**Figure 43: Mounting Video Cable Assembly on VR160 Monitor**



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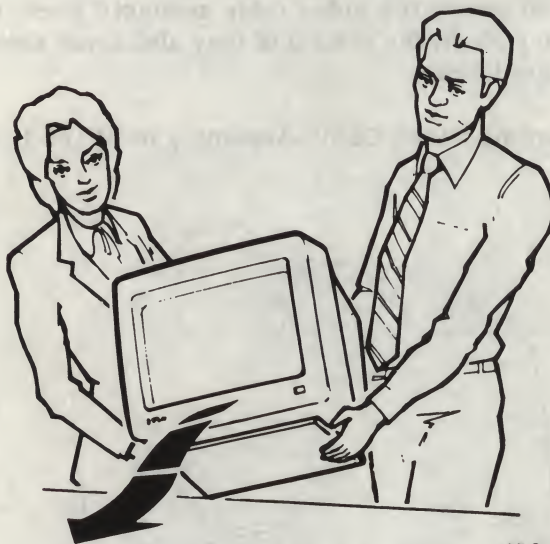
**Note:** The voltage level on the color monitor is set at the factory; therefore, you do not need to reset it.

## VR150 Monochrome Monitor

Place the monitor on a level surface near the VAXstation 2000 system unit (Figure 44).

**Caution:** This procedure requires two people. The monitor weighs 16.34 kilograms (36 pounds).

**Figure 44: Setting the VR150 on a Level Surface**



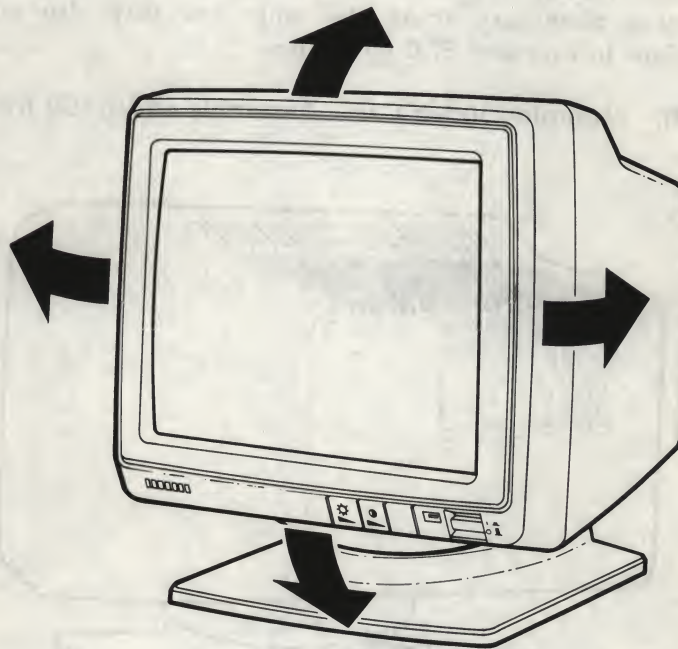
MLO-1356-87

### Adjusting Tilt of VR150 Monitor

**Caution:** The monitor does not swivel in a complete circle. If you try to swivel the monitor in a complete circle, you may damage the base.

To set the angle, tilt the monitor forward or backward to the desired position. You can swivel the monitor about its base and still maintain the tilt angle (Figure 45).

**Figure 45: Adjusting Tilt, VR150 Monitor**



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## Install Video Cable Assembly, VR150 Monochrome Monitor

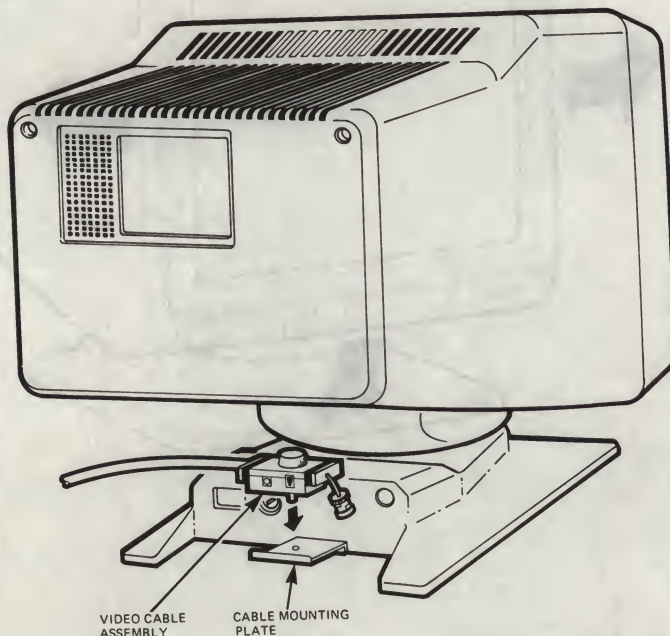
If you have a VR150 monochrome monitor with a 4-plane graphics coprocessor for gray-scale display on your screen, you need to install a color video cable assembly on your VR150 monitor. Follow the instructions for the VR150 monochrome monitor with color cable to use the 4-plane graphics coprocessor with your monochrome monitor.

### VR150 Monochrome Monitor without Gray-scale

1. Screw the video cable assembly into the cable mounting plate (Figure 46).

**Caution:** Failure to secure the video cable assembly to the cable mounting plate may strain the cable and may also cause radio emissions in excess of FCC guidelines.

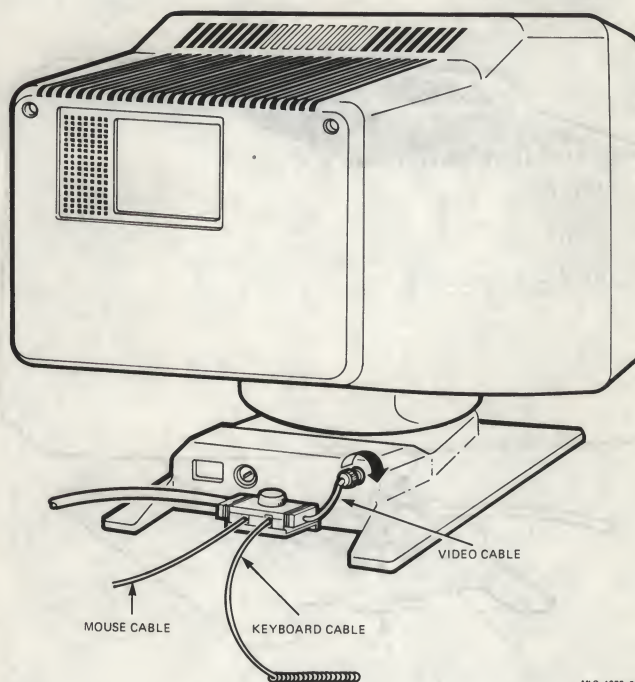
**Figure 46: Mounting Video Cable Assembly on VR150 Monitor**



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2. Connect the video cable to the video connector on the rear panel.
3. Push the cable in and turn the connector clockwise to lock it in place (Figure 47).

**Figure 47: Connecting the Video Cable, VR150 Monitor**



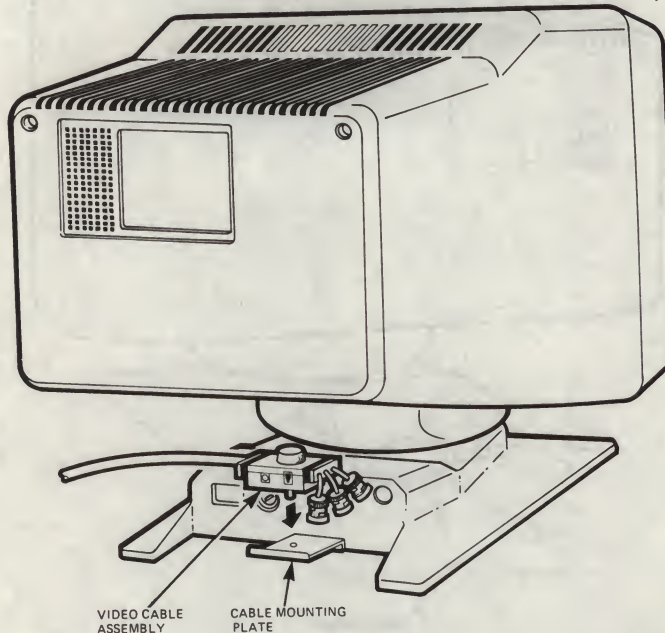
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## VR150 Monochrome Monitor with Gray-scale

1. Locate the shorter knob of the two knobs that comes with the color video cable.
2. Screw the video cable assembly into the cable mounting plate (Figure 48).

**Figure 48: Mounting Video Cable Assembly on VR150 Monitor, Color Cable**



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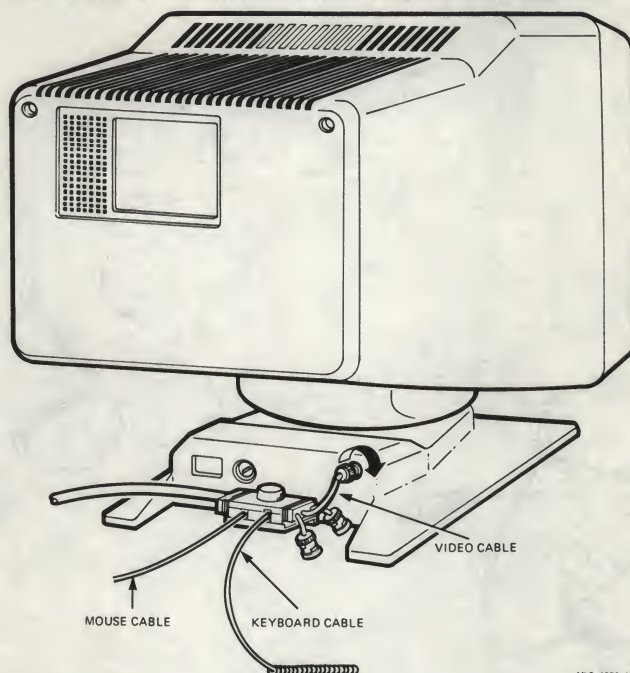
**Caution:** Failure to secure the video cable assembly to the cable mounting plate may strain the cable and may also cause radio emissions in excess of FCC guidelines.

3. Connect ONLY the G video cable to the video connector on the rear panel (Figure 49).
4. Push the cable in and turn the connector clockwise to lock it in place.



**Note:** The R and B connectors will hang freely — do not connect them to anything.

**Figure 49: Connecting G Cable Connector, VR150 Monitor**

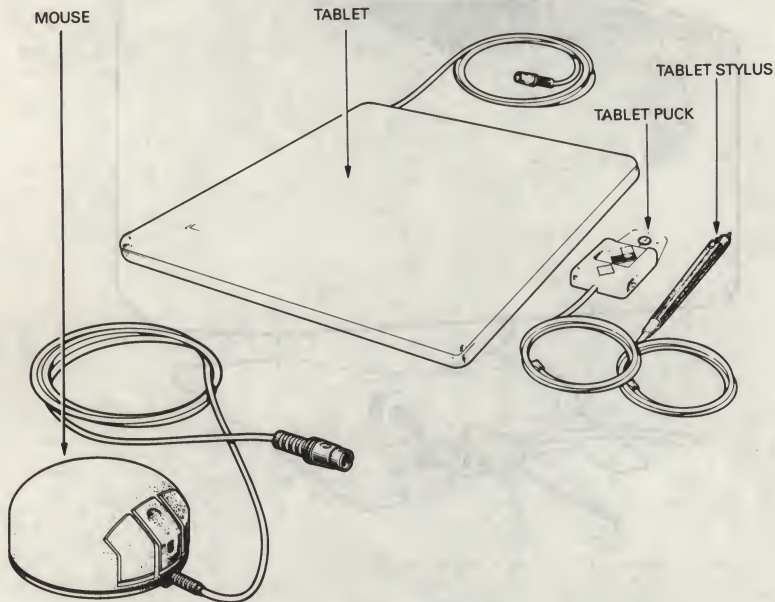


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### Connect the Pointing Device to the VR150 Monochrome Monitor

Locate the pointing device you wish to use, which may be either a mouse (standard) or a tablet (optional) (Figure 50). The mouse and the tablet cannot be used at the same time.

**Figure 50: Mouse and Tablet, VR150 Monochrome Monitor**



MLO-357-87

If you are installing a tablet, attach the puck or stylus to the tablet before connecting the tablet to the VAXstation 2000. The instructions that come with the tablet explain how to connect those components.

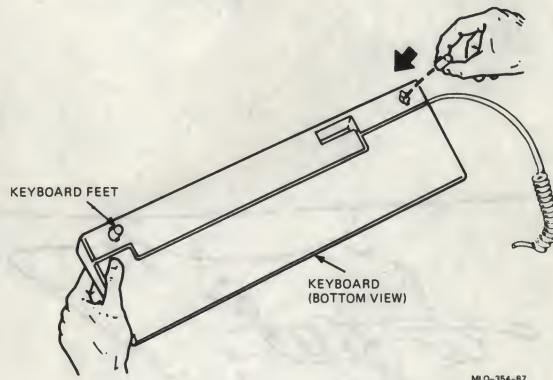
**Caution:** Never disconnect or connect the pointing device cable while the system power is on.

**Note:** To switch the tablet's puck and stylus, first disconnect the tablet from the VAXstation 2000, then swap the puck or stylus, and reconnect the tablet to the system.

## Connect the Keyboard to the VR150 Monochrome Monitor

1. Locate the keyboard.
2. Turn the keyboard over and install the keyboard feet (Figure 51). Installation of the keyboard feet is optional.

**Figure 51: Installing the Keyboard Feet, VR150 Monochrome Monitor**



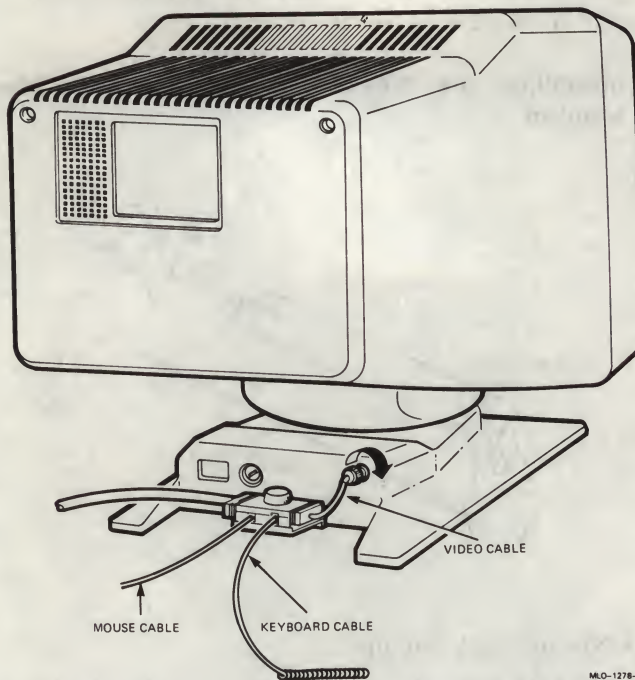
3. Turn the keyboard right side up.

**Caution: Never disconnect or connect the pointing device cable while the system power is on.**

4. Connect the keyboard cable and pointing device cable to the appropriate video cable assembly (Figure 52 or 53).

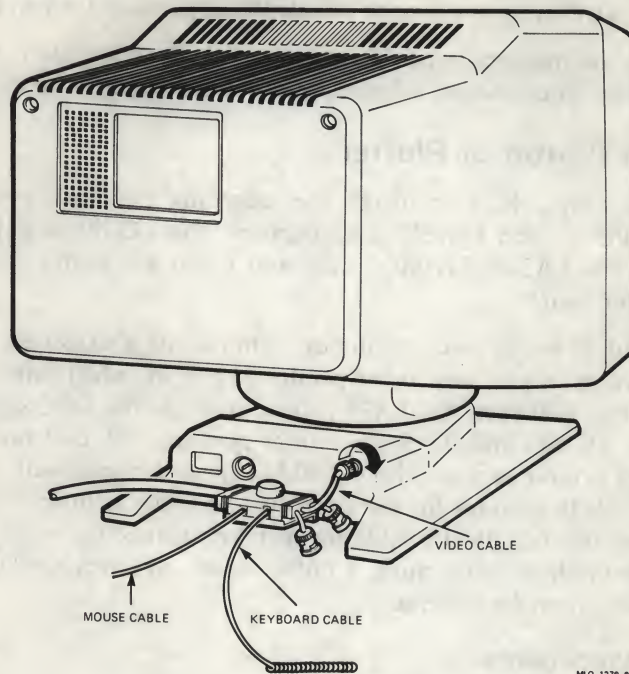


**Figure 52: Pointing Device and Keyboard Connection, VR150 Monitor**



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**Figure 53: Pointing Device and Keyboard Connection, VR150 Monitor with Color Cable**



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If you do not have any options to install, proceed to the section on Connect the Power Cords.

## Install the Options

To install a printer, a modem, or expansion box cables, follow the instructions in this section under the option you are installing. The options can be installed in any order; however, it is easier to install the expansion box(es) last.

If you order the memory *module* or expansion adapter after the initial shipment, contact your service representative to install those items.

### Installing a Printer or Plotter

This section describes how to install the following DIGITAL printers: the LN03, LN03 PLUS, and LN03R laser printers, the LCG01 and LJ250/252 color printers, the LA210, LA100, LA75, and LA50 *dot matrix* printers, and the LVP16 color *plotter*.

Cables are required to connect a printer or plotter to the VAXstation 2000. You must order a cable in addition to the printer or plotter. Most printers require the BCC05 cable; however, the LA75 printer requires the DECconnect office cable (part no. BC16E) and the 9-pin printer port adapter (part no. H8571B). The LJ250/252 printer requires the BC19M cable and comes with a modified modular jack (MMJ) adapter for *workstations* using DECconnect. The LVP16 plotter requires the BCC19-15 cable for a direct connection or a BCC24-05 cable for an eavesdrop connection. Contact your sales representative if you did not already order these items.

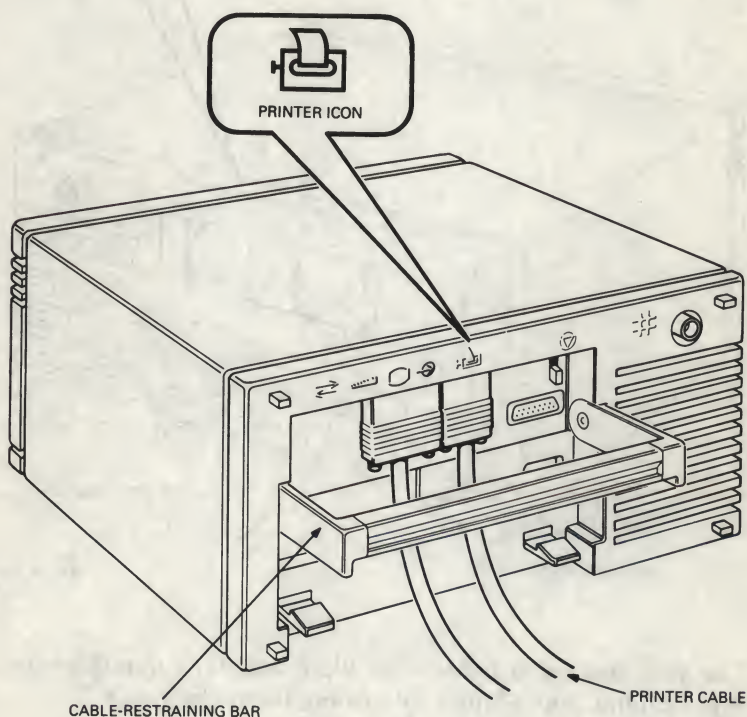
### Installation Procedures

1. Unpack and set up the printer or plotter according to instructions that are shipped with the printer or plotter.
2. Make sure that the on-off switches for the printer or plotter and the VAXstation 2000 system unit are set to 0 (off).



3. To connect LN03, LN03 PLUS, LN03R, LA210, LA100, LCG01, LA50 printers or the LVP16 plotter, do the following:
  - a. If the cable-restraining bar on the rear of the VAXstation 2000 is not already lifted, lift it up.
  - b. Locate the printer cable (part no. BCC05), or BC19M cable for the LJ250/252 or plotter cable (part no. BCC19-15 or BCC24-05).
  - c. Attach the larger end of the printer or plotter cable to the back of the printer or plotter. (Check the documentation that shipped with the printer or plotter.)
  - d. Attach the free end of the printer or plotter cable to the printer port on the back of the VAXstation 2000 (Figure 54). The printer port is identified with the printer icon.

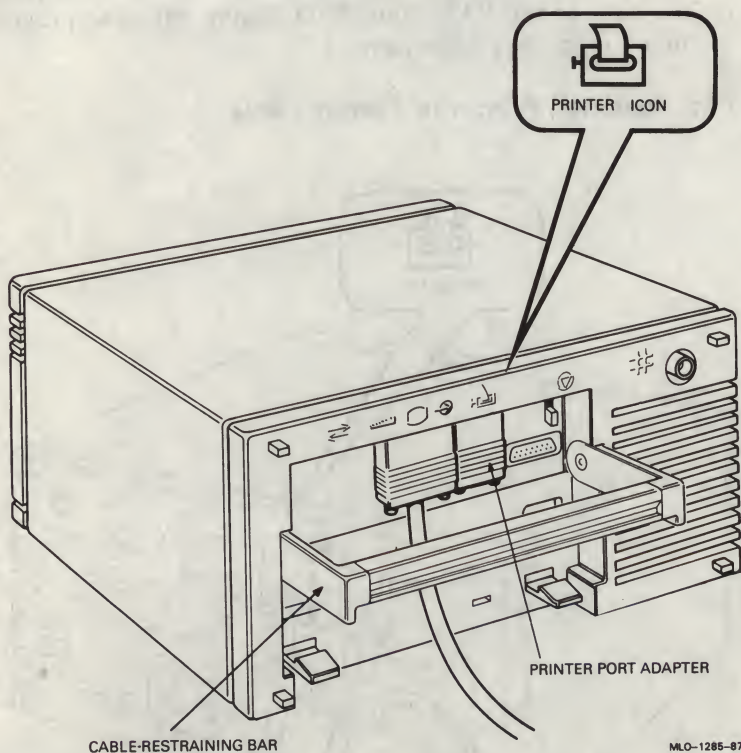
**Figure 54: Installed Printer or Plotter Cable**



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4. To connect the LA75 printer, do the following:
  - a. Locate the 9-pin printer port adapter (part no. H8571B).
  - b. If the cable-restraining bar on the rear of the VAXstation 2000 system unit is not already lifted, lift it up.
  - c. Connect the printer port adapter (Figure 55) to the printer port on the rear of the VAXstation 2000 system unit. The printer port is identified with the printer icon.

**Figure 55: Installed Printer Port Adapter**

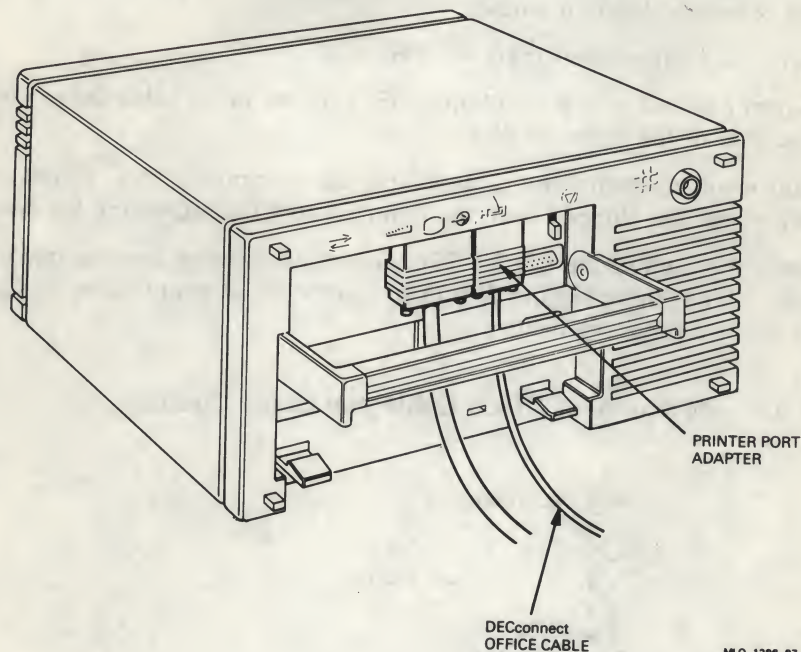


- d. Use your fingers to tighten the 9-pin adapter's thumbscrews on the 9-pin printer port adapter by turning them clockwise.
- e. Locate the DECconnect office cable (part no. BC16E).



- f. Connect either end of the DECconnect office cable into the printer port adapter (Figure 56). (The two ends of the DECconnect office cable are identical and, therefore, interchangeable.)

**Figure 56: DECconnect Office Cable Installed in Printer Port Adapter**



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- g. Connect the free end of the DECconnect office cable into the LA75's 6-pin connector. (Check the documentation that shipped with the LA75 to locate the 6-pin connector.)

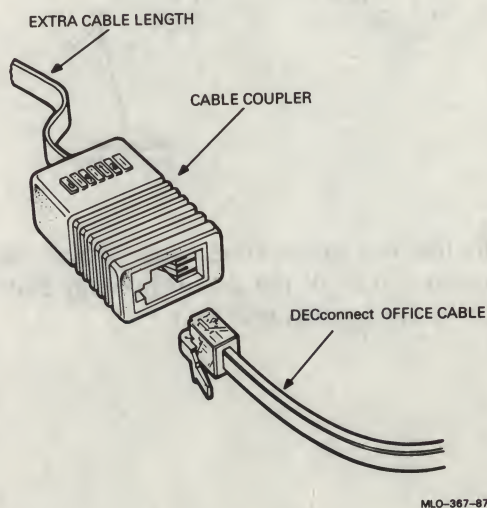


### Extending LA75's DECconnect Office Cable

To extend the length of the LA75's DECconnect office cable, do the following. If you do not have the optional items mentioned, contact your sales representative.

1. Locate the additional DECconnect office cable. The DECconnect office cable comes in different lengths.
2. Locate the cable coupler (part no. H8572).
3. Insert either end of the additional DECconnect office cable length into either side of the cable coupler.
4. If you want to shorten the cable length, use a crimping tool. Follow the instructions that shipped with the crimping tool for shortening the cable.
5. Insert either end of the LA75's DECconnect office cable into the free end of the cable coupler (Figure 57). (You can install as many cable couplers as you have cable segments.)

**Figure 57: DECconnect Office Cable and Cable Coupler**



## Operation Procedures

Set the printer's *baud rate* to 4800 to match the VAXstation 2000 system unit's printer port baud rate. (Refer to the documentation that shipped with the printer for setting the baud rates.) Then check the following list to see what procedures you need to follow for the proper operation of your printer.

- For systems *running* ULTRIX operating system software, you must set the printer for 7-bit ASCII. (Refer to the documentation that shipped with the printer to set 7-bit ASCII.)
- The LA210 printer requires that the XOFF and Wrap be enabled. (Refer to the LA210 documentation for switch-toggling information.)

To properly operate the LVP16, set the rocker switches according to the following list. This information supplements the *LVP16 Graphics Plotter Owner's Manual*.

- B1 through B4 control baud rate. For example, set B1 and B4 to on for a 4800-baud rate.
- The next two switches control paper size. For example, set to US and A4 for United States letter size paper.
- The Y/D switch controls cabling. The D setting is for a direct connection, and the Y setting is for the eavesdrop connection.
- The S1 and S2 switches control *byte* size and parity. Set both to off for 8-bit bytes and no parity checking.

After you have properly completed all the instructions in this guide and successfully installed the operating system, complete the following procedures for proper operation of the printer:

- Refer to the operating system documentation to define the printer port.
- For systems running ULTRIX operating system software, you must *run* LPR setup. Refer to the *ULTRIX-32 System Management Guide*.



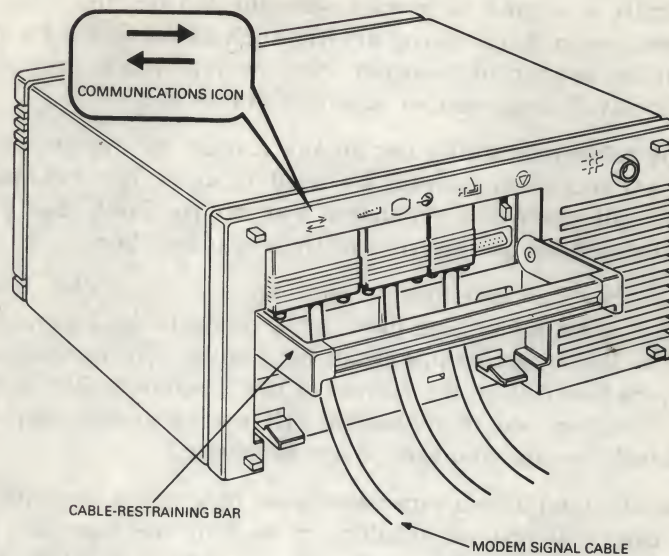
## Installing a Modem

A modem allows *communication* between the VAXstation 2000 and another system over telephone lines. This section describes how to install the DF112, DF124, and DF224 modems.

1. Unpack and set up the modem according to instructions that shipped with the modem.
2. Set the modem's baud rate to 1200 to match the VAXstation 2000 system unit's communication port's baud rate. (Refer to the documentation that shipped with the modem for setting baud rates.)
3. Locate the modem's 25-conductor cable (part no. BCC04). If you do not already have this cable, you must order one from your sales representative.
4. Connect an end of the 25-conductor cable to the modem's 25-pin connector. (Check the documentation that shipped with the modem to locate the modem's 25-pin connector.)
5. If the cable-restraining bar on the rear of the VAXstation 2000 system unit is not already raised, lift it up.
6. Connect the free end of the modem's 25-conductor signal cable to the port on the VAXstation 2000 labeled with the double-arrow communications icon (Figure 58).
7. Use your fingers to tighten the thumbscrews on the modem's signal cable by turning them clockwise.
8. Replace the cable-restraining bar by pressing it in with your fingers until it locks into place.



**Figure 58: Installed Modem Signal Cable**



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## Installing an Expansion Box

**Caution:** Only devices such as the RD53-Fx and the RD54-Fx, which were specifically designed to operate with the VAXstation 2000, may be attached to connector B. Likewise, devices such as the RD53-Fx or RD54-Fx must not be connected to other systems for which they were not designed. Circuit damage and/or data loss may occur.

**Caution:** The cable-restraining bar on the rear of the expansion box can be used as a handle and should be used to carry the expansion box. However, do not place the expansion box on its front, doing so may damage the drive door on the front of the expansion box.

The expansion box houses either a *tape drive* or a *fixed disk drive* and is shipped with a drive cable. The drive cable connects the expansion box to the VAXstation 2000 system unit's expansion adapter. The expansion adapter must already be installed on the bottom of the VAXstation 2000 system unit before the expansion box is connected. (If the expansion adapter is not already installed, contact your service representative.)

You may install a total of two expansion boxes (one with a *fixed disk* and one with a *tape drive*). If you are installing more than one expansion box, first install the expansion box with the tape drive, and then install the expansion box with the fixed disk.

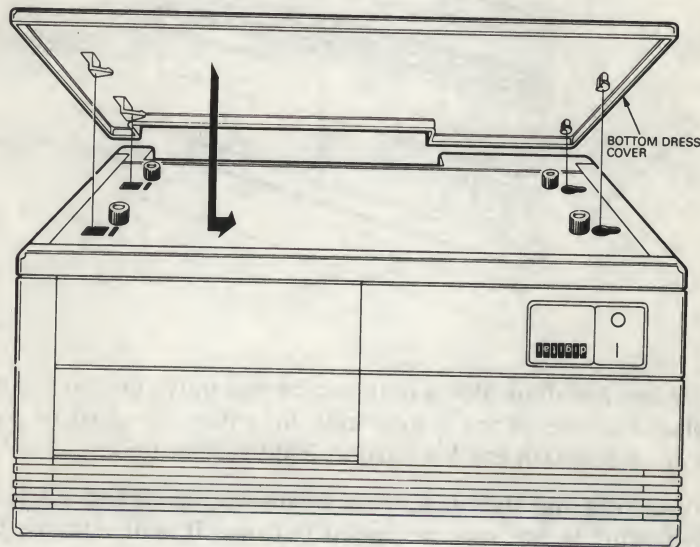
## Positioning the Expansion Box

1. You may set up the expansion box on top of the system unit, underneath the VAXstation 2000 system unit, on its bottom rubber feet, or on its side (either side).

If you want to position the expansion box on its side, you should first install the bottom dress cover. To install the bottom dress cover, do the following:

- a. Place the expansion box upside down on a level surface.
- b. Locate the bottom dress cover. Line up the molded inserts on the inside of the bottom dress cover over the holes on the bottom of the expansion box (Figure 59). Then slide the bottom dress cover until it locks into place.

**Figure 59: Bottom Dress Cover on Expansion Box**

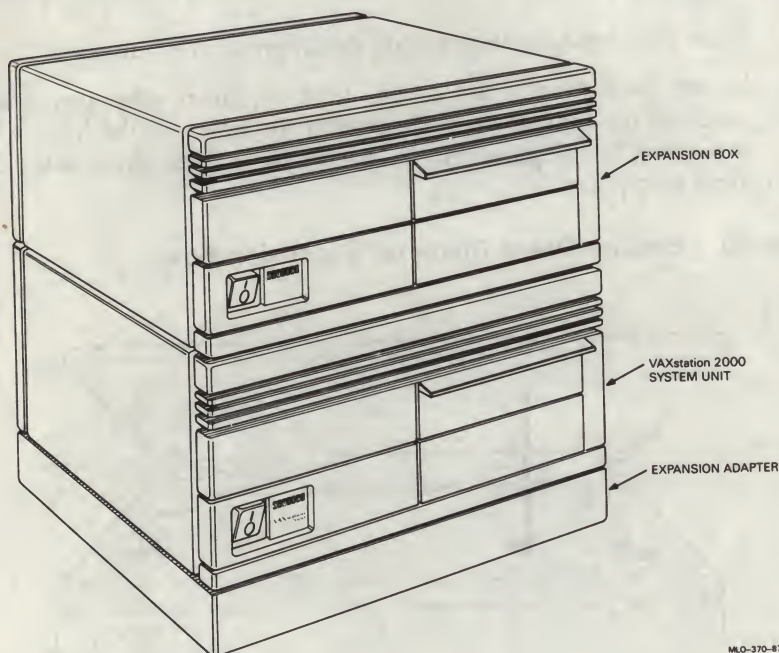


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2. Place the expansion box on a level surface in one of the recommended positions. (The illustrations throughout this guide show one expansion box set up on top of the VAXstation 2000 system unit (Figure 60). If you wish to position the expansion box in one of the other positions, follow the text and use the illustrations for cabling installation reference.)

**Figure 60: Expansion Box on Top of System Unit**



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If you are installing two expansion boxes, only one expansion box can be placed on top of the system unit; the other one must be placed on its side or underneath the VAXstation 2000 system unit.

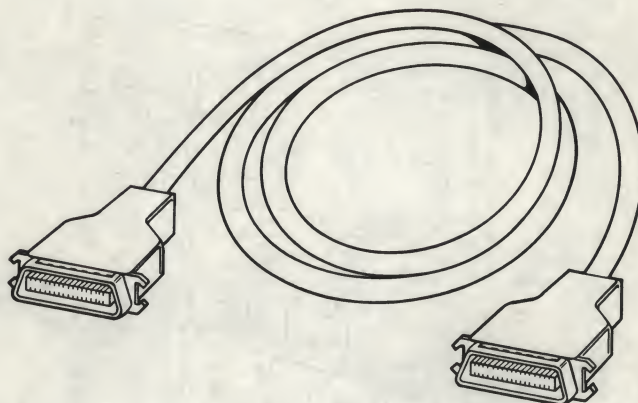
**Caution: Placing two expansion boxes on top of the VAXstation 2000 system unit is not recommended because it will damage the system unit and internal boards.**

3. If you are installing an expansion box with a tape drive, follow the instructions under Installing the Tape Drive Cable. If you are installing an expansion box with a disk drive, follow the instructions under Installing the Disk Drive Cable.

## Connecting the Tape Drive Cable

1. Locate the tape drive cable (part no. BC19J). (The tape drive cable is available in different lengths; therefore, your tape drive cable may be different than in Figure 61).

**Figure 61: Tape Drive Cable**

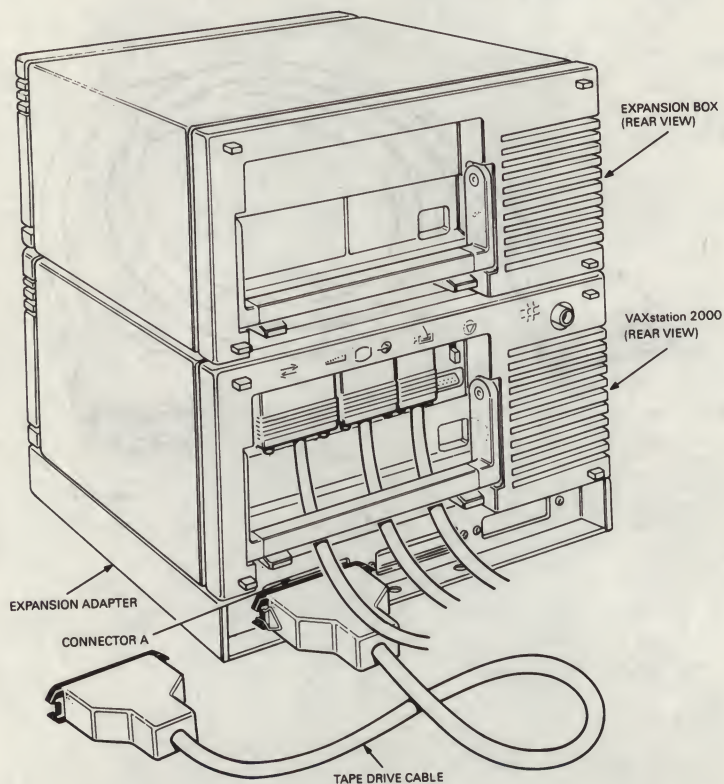


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2. Insert an end of the tape drive cable into connector A on the expansion adapter (Figure 62). (Each end of the cable is identical and, therefore, interchangeable.)

**Figure 62: Tape Drive Cable Installed in Expansion Adapter**

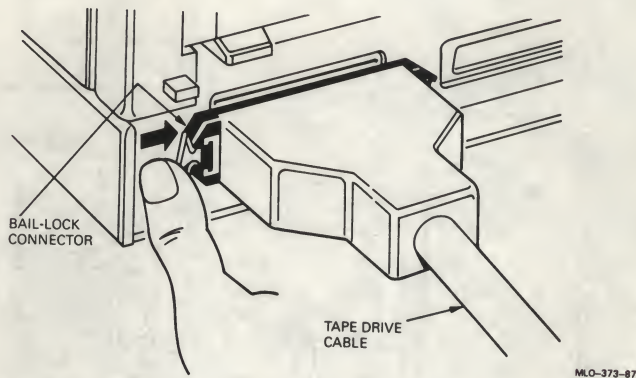


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3. Fasten the bail lock connectors on the tape drive cable connector by pressing them in with your finger (Figure 63).

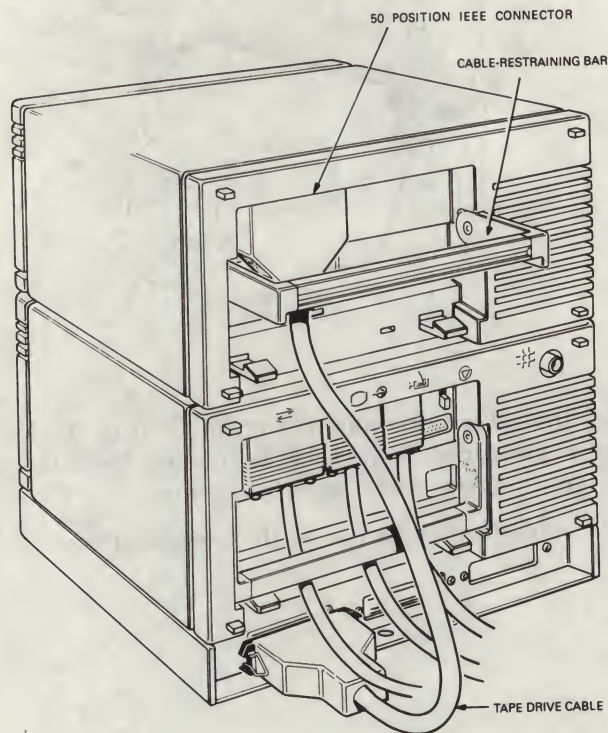
**Figure 63: Fastening the Bail Lock Connectors**



4. Make sure the cable-restraining bar on the rear of the VAXstation 2000 system unit is replaced. If the cable-restraining bar is not replaced, press it in with your fingers until it locks into place.
5. Lift up the cable-restraining bar on the expansion box.

6. Insert the free end of the tape drive cable under the cable-restraining bar on the expansion box and into the 50-position IEEE connector on the expansion box (Figure 64).

**Figure 64: Tape Drive Cable Installed in Expansion Box**



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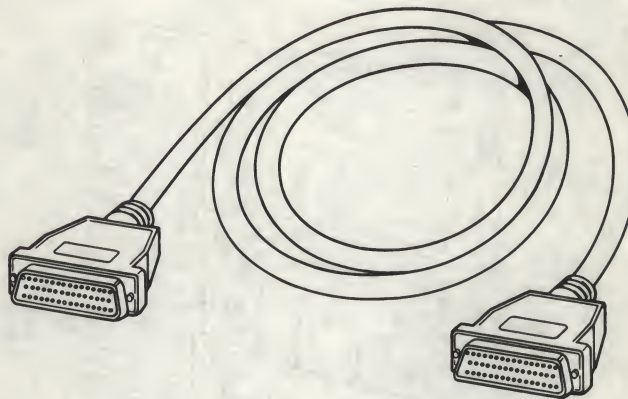
7. Fasten the bail lock connectors on the tape drive connector by pressing them in with your finger.



## Connecting the Disk Drive Cable

1. Locate the disk drive cable (part no. BC17Y). (The disk drive cable is available in different lengths; therefore, your disk drive cable may be different than in Figure 65).

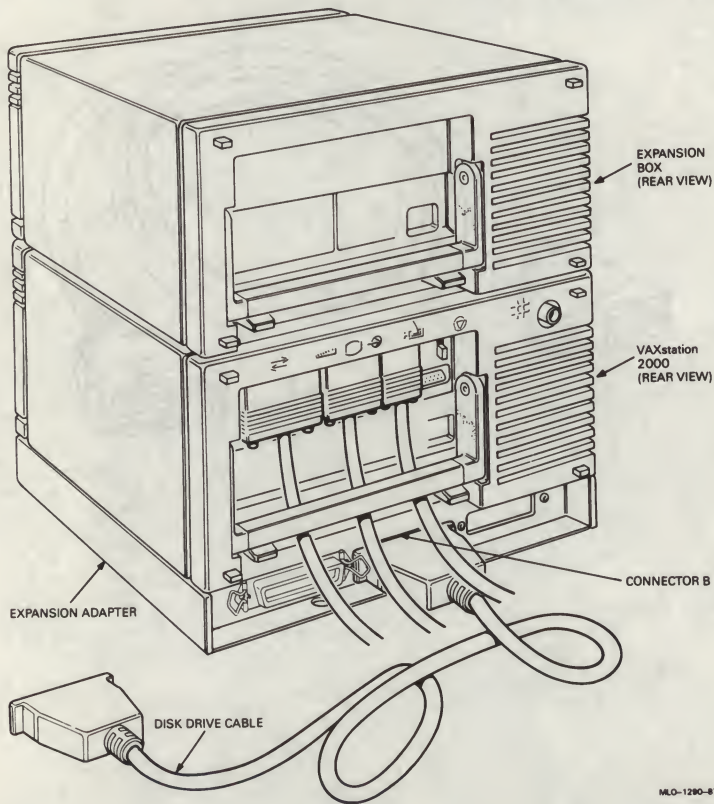
**Figure 65: Disk Drive Cable**



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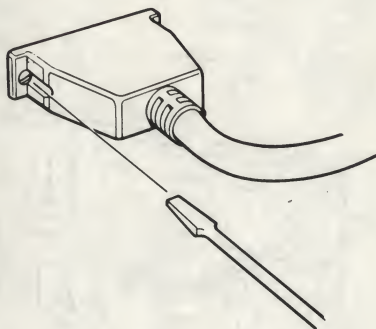
2. Insert an end of the disk drive cable into connector B on the expansion adapter (Figure 66). (Each end of the cable is identical and, therefore, interchangeable.)

**Figure 66: Disk Drive Cable Installed in Expansion Adapter**



3. Use the flat-blade screwdriver you received with your shipment to turn the two disk drive cable connector screws clockwise (Figure 67).

**Figure 67: Fastening the Disk Drive Cable**



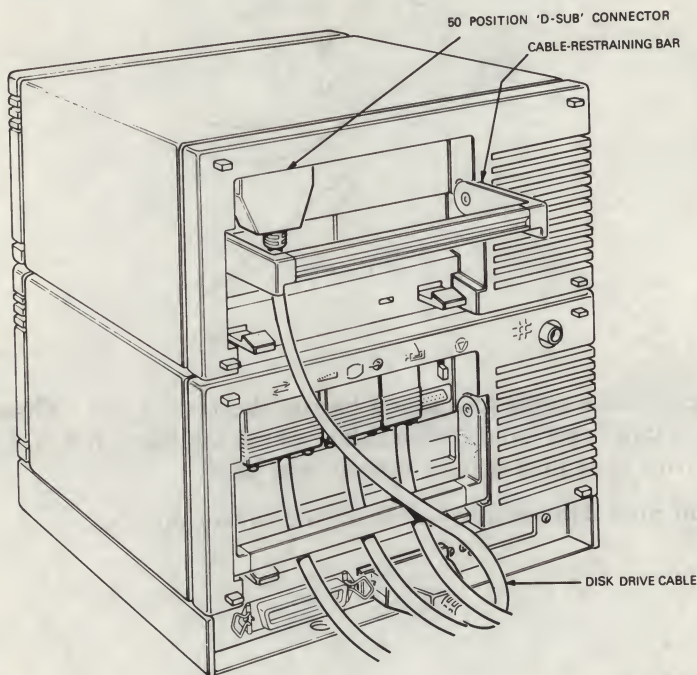
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4. Make sure the cable-restraining bar on the rear of the VAXstation 2000 system unit is replaced. If the cable-restraining bar is not replaced, press it in with your fingers until it locks into place.
5. Lift up the cable-restraining bar on the expansion box.



6. Insert the free end of the disk drive cable under the cable-restraining bar on the expansion box and into the 50-position D-sub connector on the expansion box as shown in Figure 68.

**Figure 68: Disk Drive Cable Installed on the Expansion Box**

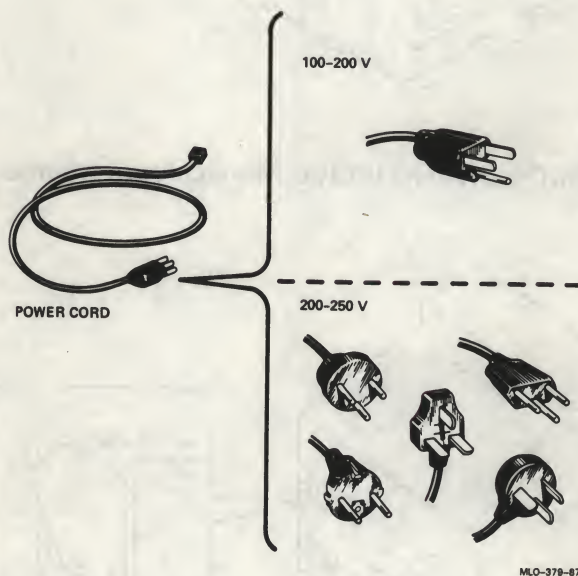


7. Use the flat-blade screwdriver to turn the two disk drive cable connector screws clockwise to fasten the cable connector.

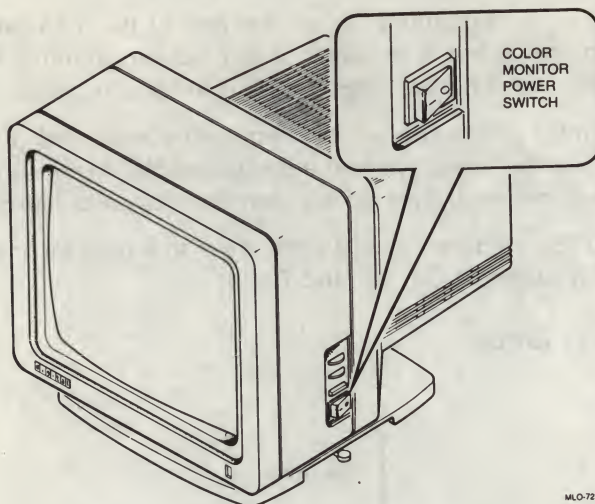
## Connect the Power Cords

1. Make sure the cable-restraining bar on the rear of the VAXstation 2000 and on any expansion box is replaced. If any cable-restraining bar is not replaced, press it in with your fingers until it locks into place.
2. Locate the monitor power cord and system unit power cord (Figure 69). The two cords are the same type and interchangeable. Make sure that the plugs fit the wall outlet. If they do not, contact your sales representative.
3. Make sure that the monitor on-off switch is set to 0 (off) for the monitor that you have (Figures 70, 71, 72, and 73).

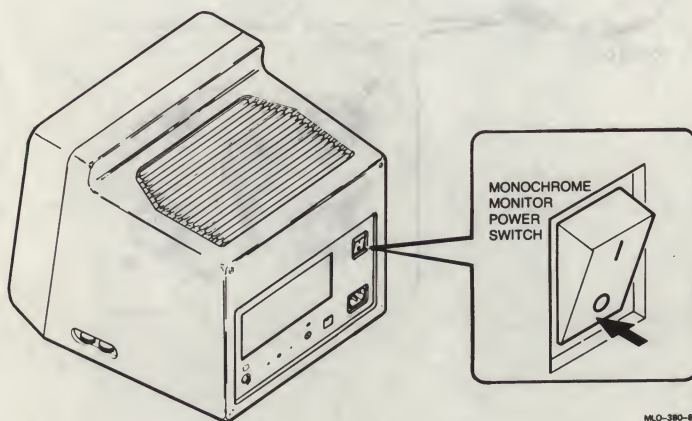
**Figure 69: Power Cords**



**Figure 70: On-Off Switch, VR290 Color Monitor**

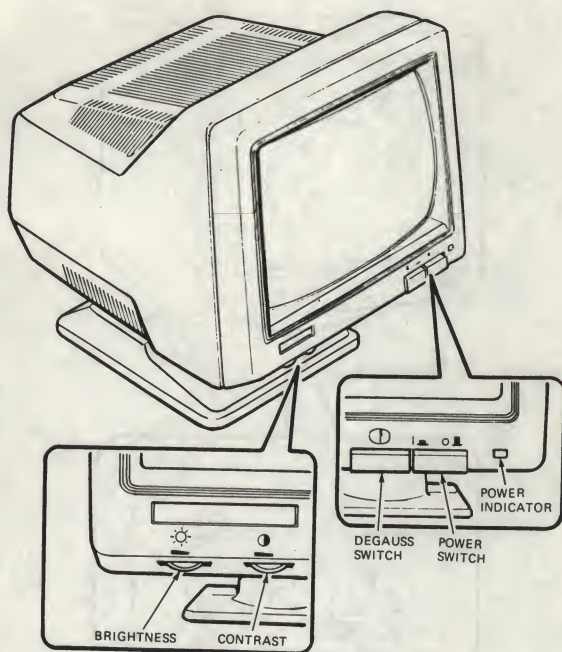


**Figure 71: On-Off Switch, VR260 Monochrome Monitor**



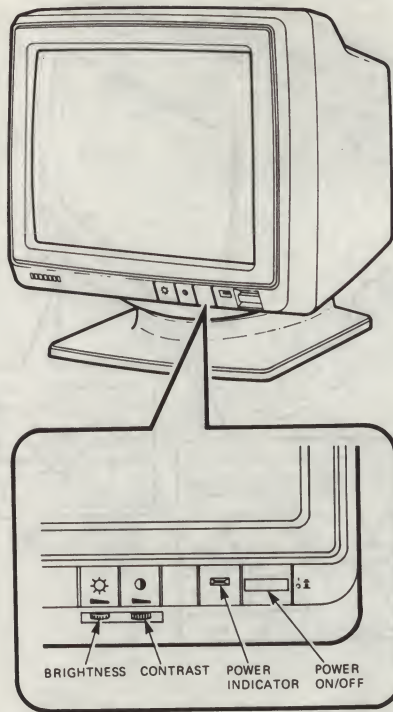


**Figure 72: On-Off Switch, VR160 Color Monitor**



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**Figure 73: On-Off Switch, VR150 Monochrome Monitor**



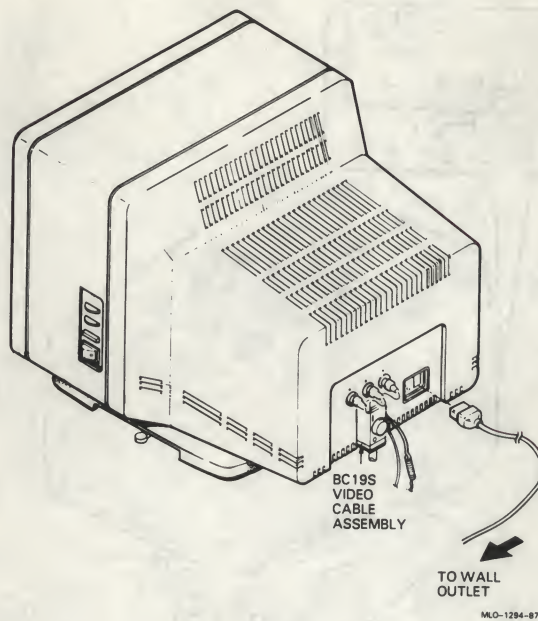
MLO-1293-87

4. Connect the monitor's power cord to the monitor first and then to an outlet (Figures 74, 75, 76, and 77).

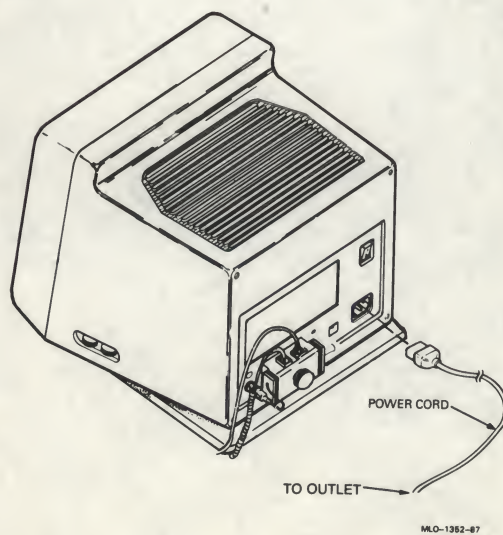
**Warning:** Place the power and system cables in areas where no one will trip over them or step on them. Avoid straining or sharply bending the cables.

**Caution:** To avoid damaging a monitor that has been moved inside from a cold environment, let the monitor warm to room temperature before you turn it on.

**Figure 74: Power Cord Connection, VR290 Color Monitor**

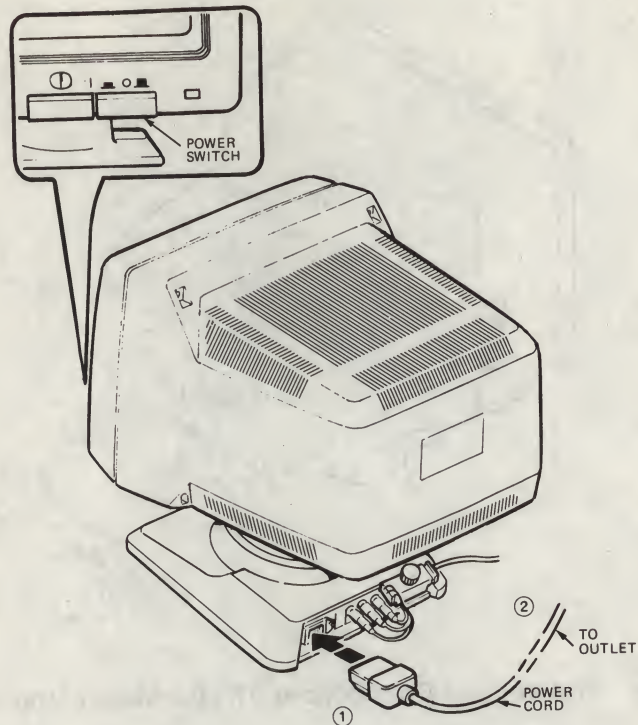


**Figure 75: Power Cord Connection, VR260 Monochrome Monitor**



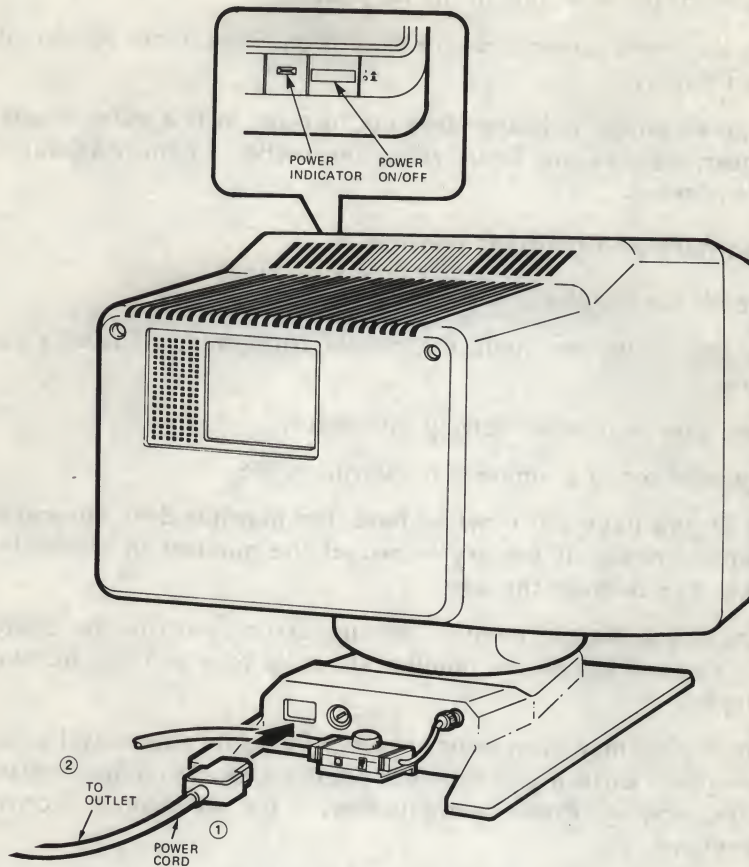


**Figure 76: Power Cord Connection, VR160 Color Monitor**



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**Figure 77: Power Cord Connection, VR150 Monochrome Monitor**



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## Power Up the Monitor

1. Set the monitor power switch to the on position.
2. Watch for the green power indicator to turn on. Wait about 30 seconds for a video display.

**Note:** If the green power indicator does not turn on, or if a video display does not appear, refer to the Troubleshooting section in the *VAXstation 2000 Owner's Manual*.

### Set the brightness and contrast controls.

1. Increase both the brightness and contrast to maximum.
2. Decrease the brightness until the *raster* (background intensity) just disappears.
3. Adjust the contrast to your viewing preference.
4. Adjust the monitor to a comfortable viewing angle.

**Caution:** If you have a tilt-swivel base, the monitor does not swivel in a complete circle. If you try to swivel the monitor in a complete circle, you may damage the base.

5. To set the angle, tilt the monitor forward or backward to the desired position. You can swivel the monitor about its base and still maintain the tilt angle.
6. The color monitor may show signs of poor color purity after swivel action. Poor color purity exists if you see other colors scattered in different places in the screen display. Press the degauss switch for five seconds to correct color distortions.

**Note:** If you need to press the degauss switch again, wait 10 minutes to allow the circuit to fully reactivate.

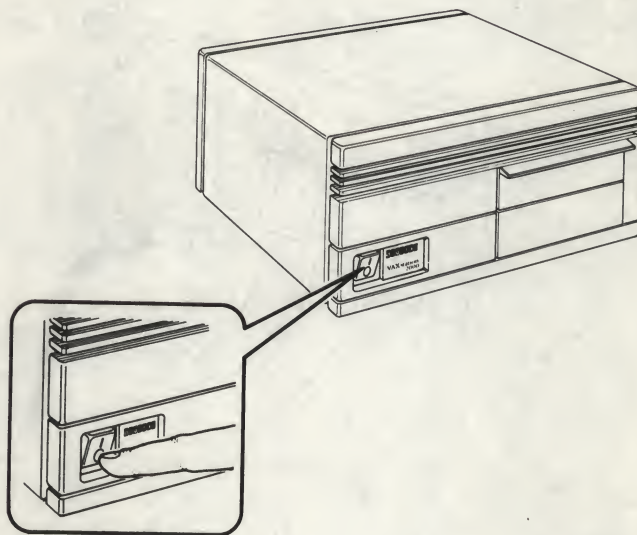
7. Be sure to power off the monitor before you power up the system.



## Power Up the System

1. Make sure that the on-off switch on the VAXstation 2000 system unit is set to 0 (off) (Figure 78).

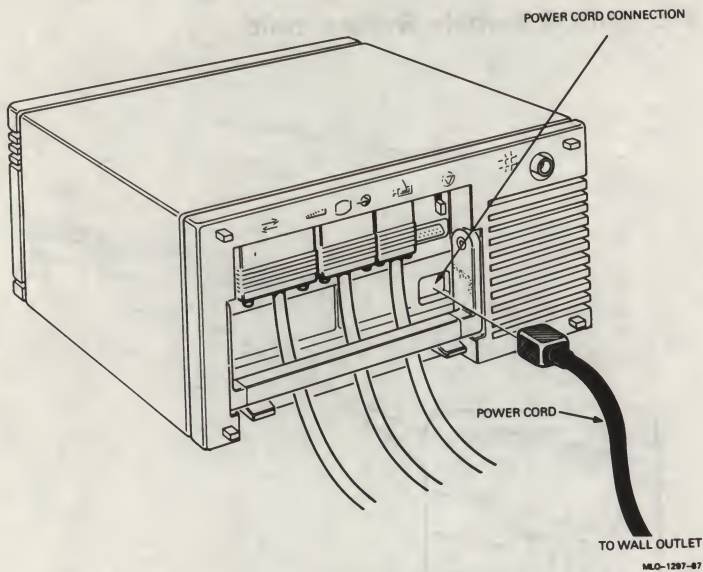
**Figure 78: On-Off Switch, System Unit**



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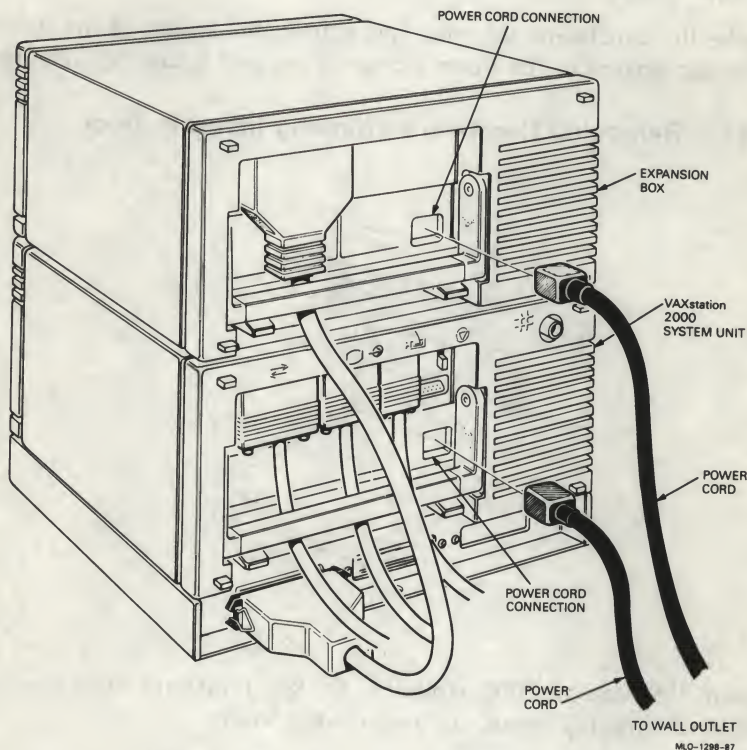
2. Connect the VAXstation 2000 system unit's power cord to the system unit first and then to an outlet (Figure 79).

**Figure 79: Power Cord Connection, System Unit**



3. If you have the optional expansion box(es) installed, make sure the expansion box on-off switch is also set to 0 (off). (The on-off switch on the expansion box is located in the same place as the system unit's on-off switch.) Then connect the expansion box power cord to the expansion box and then to an outlet (Figure 80).

**Figure 80: Power Cord Connection, Expansion Box**



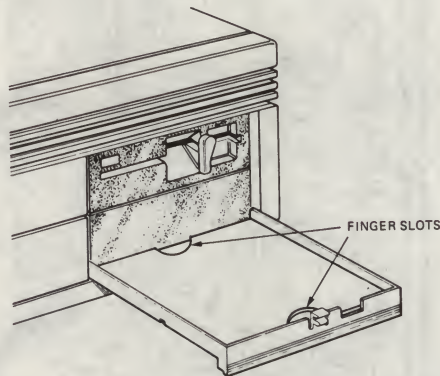


## Power Up and Test the VAXstation 2000

The VAXstation 2000 *diagnostics* tests are stored in VAXstation 2000 *read-only memory*. After every *power up*, the VAXstation 2000 automatically starts the system tests, which check the components of your system. The first time you power up your system, follow the steps in this section to ensure proper functioning of your VAXstation 2000.

1. Before you turn on your system, open the drive door on the front of the VAXstation 2000.
2. Remove the cardboard shipping insert from the inside of the drive door by placing fingers in the insert's finger slots and lifting out (Figure 81).

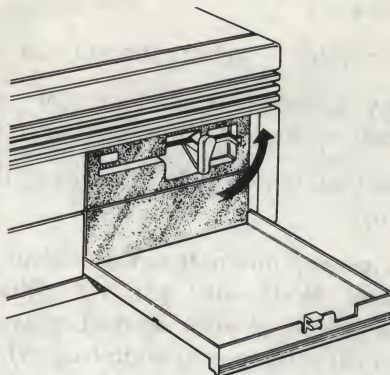
**Figure 81: Removing Cardboard Shipping Insert in Door**



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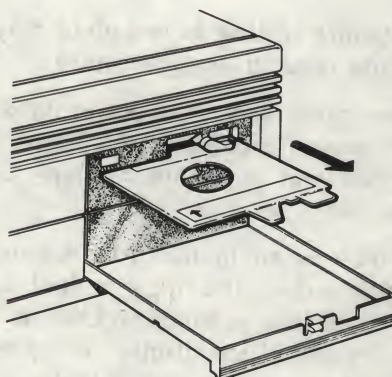
3. If your VAXstation 2000 contains an RX33 *diskette drive*, remove its cardboard shipping insert. To remove the insert:
  - a. Flip up the lever on the diskette drive (Figure 82).
  - b. Remove the cardboard insert (Figure 83).
4. Close the drive door.

**Figure 82: Diskette Drive Lever**



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**Figure 83: Removing Cardboard Shipping Insert in Diskette Drive**



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**Caution:** Power up any expansion boxes before powering on the system unit so that any tapes or disks can be included in the configuration.

5. Power up the equipment.

- a. Power up the monitor by setting the monitor power switch to 1 (on).
- b. Power up any optional equipment (for example, printers and expansion boxes) by setting the on-off switch to 1 (on).
- c. Power up the VAXstation 2000 by setting the system unit power switch to 1 (on).

**Caution:** Do not power down the VAXstation 2000 until power-up testing is complete. Wait until you see either the *console prompt* (>>>) or the first screen of your operating system software or wait until the system unit attempts to *bootstrap*. If the following display appears, press the halt button to see the results of the self test.

```
B3 BOOT SYS
-DUAO
-ESAO
?54 RETRY
```

**Powering down before testing is complete may destroy data in the system's nonvolatile random-access memory.**

6. The monitor screen then displays a power-up display. The following three displays are examples of successful power-up displays. Find the display that matches your power-up display. Some of these displays require user interaction.

Possible system problems are indicated by one or two question marks (?) or ??) on the monitor screen. If a single or double question mark appears and no explanation of this possible problem is given in the example, or if you do not see one of the displays listed below, power down the VAXstation 2000 and review each installation step. Repeat the power-up procedure. If you still have trouble, refer to the *VAXstation 2000 Owner's Manual*, Chapter 2 (Troubleshooting).



- a. You may see a display similar to the following:

KA410-A V2.1

F...E...D...C...B...A...9...8...7...6...5...4...3\_2\_1?..

```
? E 0040 0000.0005
? D 0050 0000.0005
? 6 00A0 0000.4001
?? 1 00C0 0000.7004
>>>
```

If the line with the ? E appears, the system time clock has not been set. When you install the operating system software, you will set the date and time.

If the line with the ? D appears, the battery charge is low. Once the system is powered up, it will take about 17 hours for the battery to recharge.

If the line with the ? 6 appears, the diagnostics do not find a tape drive installed. If you do not have a tape drive installed, ignore this message. However, if you do have a tape drive installed, power down the VAXstation 2000 system unit and review the tape drive installation steps (refer to *Installing the Expansion Box*). If you still have trouble, refer to the *VAXstation 2000 Owner's Manual*, Chapter 2 (Troubleshooting).

If the line with the ?? 1 appears, the *Ethernet* module is contained within the system unit, but the outer Ethernet cable has not been installed yet. Refer to the *Workstations and MicroVAX 2000 Network Guide*, to install the *ThinWire* Ethernet cable.

If the monitor screen displayed other possible system errors, refer to the *VAXstation 2000 Owner's Manual*, Chapter 2 (Troubleshooting). If the screen displayed only the possible system errors listed above, proceed to Enter the Test Commands.

b. Or, you may see a display similar to the following:

KA410-A V2.1

F...E...D...C...B...A...9...8...7...6...5...4...3...2...1?...

83 BOOT SYS

- DUA0

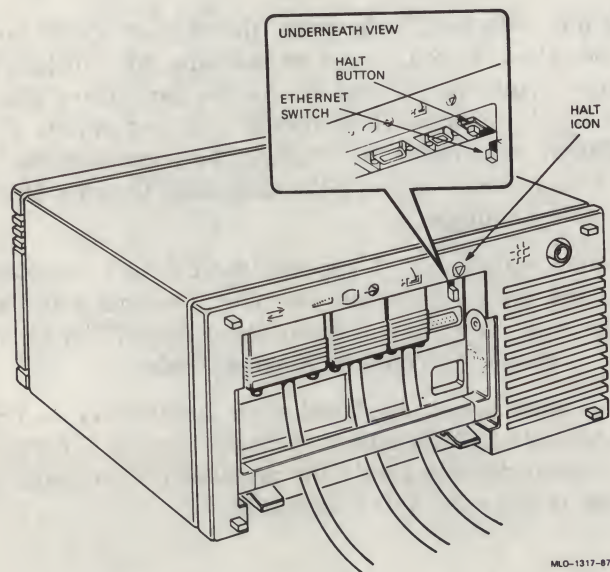
- ESA0

?54 RETRY

The screen may also display the following devices: DUA1, DUA2, or MUA0. Press the halt button to get the console prompt (>>>).

The halt button is identified with an encircled triangle or halt icon (Figure 84).

**Figure 84: Halt Button**





After you press the halt button, you will see a display similar to the following:

```
?02 EXT HLT
PC = 00001B46
>>>
```

The system was trying to search the *network* for the operating system software and did not find it. However, the networking hardware and operating system software have not been installed yet. You will be instructed later in this guide in Connect ThinWire Ethernet about where to refer for installing networking hardware. You will install the operating system software after completing the steps in this guide. Proceed to Enter the Test Commands.

- c. Or, you may see a display similar to the following:

```
KA410-A V2.1
F...E...D...C...B...A...9...8...7...6...5...4...3...2...1?...

83 BOOT SYS
- DUA0
%VMB-F-ERR, PC = nnnnnnnn
%VMB-I-STS, RO = nnnnnnnn

84 FAIL
>>>
```

This example may also display one of the following devices: DUA1, DUA2, MUA0, or ESA0. Ignore this message. This message indicates that the system did not find the operating system on the device mentioned (DUA0 in this example). However, the operating system software has not been installed yet. You will be instructed to install the operating system software after completing the steps in this guide. Proceed to Enter the Test Commands.



## Enter the Test Commands

1. The first time you power up the VAXstation 2000 system unit, you must initialize the keyboard. Select the language to match your keyboard language by pressing the corresponding number key from the keyboard language menu and then press RETURN (Figure 85). If you do not select a number and just press RETURN, the default is English (Option 3).

**Figure 85: Keyboard Language Menu**

0) Dansk	8) Français (Suisse Romande)
1) Deutsch	9) Italiano
2) Deutsch (Schweiz)	10) Nederlands
3) English	11) Norsk
4) English (British/Irish)	12) Português
5) Español	13) Suomi
6) Français	14) Svenska
7) Français (Canadien)	15) Vlaams

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**Note:** A different keyboard is supplied for each language. If you do not know the language variation of the keyboard you received, check the packing list or check with your sales representative.

The language you choose is saved in nonvolatile *memory*; therefore, subsequent powerups do not display the keyboard language menu. If you wish to change the keyboard language, refer to the *VAXstation 2000 Owner's Manual*, Chapter 2 (Troubleshooting).

2. Type **TEST 50** and press **RETURN**. The screen displays a list of devices contained in your system. An example display is shown below; your display may be different.

>>> TEST 50

KA410-A V2.1

ID 08-00-2B-02-CF-A4

MONO	0000.0001
?CLK	0000.0005
NVR	0000.0001
DZ	0000.0001
	00000001 00000001 00000001 00000001 00000001 000012A0
MEM	0002.0001
	00200000
MM	0000.0001
FP	0000.0001
IT	0000.0001
HDC	1710.0001
	000146B8 00000000 00000320
?TPC	0000.4001
FFFFF03	FFFFF05 FFFFF05 FFFFF05 FFFFF05 FFFFF05 FFFFF05 FFFFF05
SYS	0000.0001
4PLN	0000.0001 V1.0
?NI	0000.7004 V1.1

>>>

Information about the system is represented by the mnemonics listed in Table 1.

**Table 1: Definition of Mnemonics**

Mnemonics	Device
CLK	System Clock
4PLN	4-plane graphics coprocessor
DZ	Serial Line <i>Controller</i>
FP	Floating Point
HDC	Disk Controller
IT	Interval Timer
MEM	Memory
MM	Memory Management
MONO	Monochrome Video Circuits on System Module
NI	Network Interconnect Option Module
NVR	Nonvolatile RAM
SYS	Interrupt Controller and Ethernet ID ROM
TPC	Tape Controller

The "HDC" mnemonic represents the disk controller. The first group of numbers after the "HDC" line in the screen display tell you what type of device is installed. Look at Table 2 to determine which devices are listed in the display on your screen. Compare the devices listed on your screen to the devices that were installed with your system.

**Table 2: Device Numbers**

Number	Device
146B8	RD32
22000	RD53
4C437	RD54
960	RX33 media in the disk drive
320	RX50 media in the disk drive



If differences exist, review the installation procedures in this manual to make sure that every device has been properly connected. Repeat TEST 50. If differences still exist, check with your service representative.

After your VAXstation 2000 successfully completes the power-up tests, you can use the fixed disk drive to check the fixed disk and set the default *boot device* before installing the operating system software.

## The Fixed Disk Verifier

The Fixed Disk Verifier reports any faults in the fixed disks. It can also be used to determine whether a fixed disk has been formatted and to determine what kind of drives are contained in the system.

If you see single question marks for the disk drive controller (mnemonic HDC) during power up or while running the system exerciser, run the fixed disk verifier. This test locates and reports any faults in the fixed disks in the system. Give this information to your service representative.

You can also use the verifier to determine what kind of drives are contained in your system.

The verifier takes 5 minutes for an RD32 fixed disk drive, 8 minutes for an RD53, and 20 minutes for an RD54.

**Note:** The fixed disk verifier does not destroy software or data on the disk.

**Note:** Read your software documentation for shutdown procedures before halting the system.

1. Put the VAXstation 2000 in console mode by pressing the halt button on the rear of the system unit.
2. Type **TEST 71** at the console prompt (**>>>**), then press RETURN.

The following text is displayed:

```
VSmsv_QUE_unitno (0-1)?
```

3. Type **0** to verify a fixed disk drive in the system unit or **1** to verify a fixed disk in the expansion box, then press RETURN.

The following text is displayed:

```
VSmsv_STS_Siz ..... RDxx [xx represents 32 or 53, depending  
on the type of fixed disk drive.]
```

VSmsv\_QUE\_RUsure (DUAx 1/0) ? [x represents the number  
chosen, 0 or 1.]

If the disk has not been formatted or a problem occurs with the disk, the following text appears:

```
VSmsv_STS_Siz ..... ??  
VSmsv_RES_Err #2  
84 FAIL  
>>>
```

If you see this text and you want to format your disk, format it according to the instructions in Chapter 1. If the disk is faulty, the formatter program will not be able to complete the formatting procedure. If this happens, call your service representative.

4. Type 1 and press RETURN if you want to continue. To stop the verifier, type anything other than 1. The verifier stops, an error message is displayed, and the console prompt (>>>) is returned. You may start over with the **TEST 71** command or any other command.

The following sample text is displayed after you type 1:

```
VSmsv_STS_RDing .....OK  
VSmsv_STS_OBBcnt = 14  
VSmsv_STS_NBBcnt = 0  
VSmsv_RES_Succ  
>>>
```

This text verifies that the disk is in good operating condition. However, if you see the following text, the fixed disk is faulty and may need repair or replacement.

VSmsv\_STS\_NBBcnt = X [X indicates any number higher than 50]

Call your service representative.

5. Type **BOOT** (or **BOOT** followed by the name of the device that contains operating system software) at the console prompt and press Return to return to normal operation.



## Format the Fixed Disk

If you found a bad block on your disk after running the format verifier, you will need to format the fixed disk.

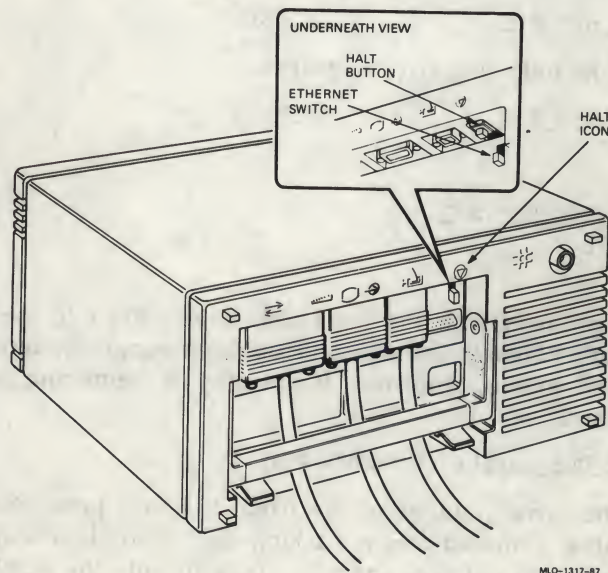
**Caution:** Formatting a disk destroys any stored software and data. If any software or data is already stored on the disk, back up your disk before formatting. If your disk is new, it should not already have any information stored on it. (Refer to the operating system software documentation for disk *backup* procedures.)

To format a fixed disk, complete the following steps. If you are going to format more than one fixed disk, complete all the steps to format one fixed disk and then run through all the steps again to format the second fixed disk.

1. Check to be sure the system is in *console mode*. Console mode is indicated by the console prompt (>>>) on the monitor screen. After you have tested the VAXstation 2000, it should be in console mode.

If the console prompt does not appear on the screen, press the halt button on the rear of the VAXstation 2000 system unit. The halt button is identified with an encircled triangle or halt icon (Figure 86).

**Figure 86: Halt Button**



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2. At the console prompt, type **TEST 70** and press RETURN.

The following text appears on the monitor screen:

```
KA410-A RDRXfmt
```

```
VSfmt_QUE_unitno (0-2) ?
```

3. Type the number **0** to format a fixed disk drive in the system unit. Type the number **1** to format a fixed disk drive in the expansion box.

If everything is working normally, the following text is displayed:

```
VSfmt_STS_Siz
```

If you have typed an incorrect number, the following text is displayed:

```
VSfmt_RES_ERR #1
```

If an *error message* occurs, start over at the first step of the formatting procedure. If you continue to see the error message, refer to the *VAXstation 2000 Owner's Manual*, Chapter 2 (Troubleshooting), for information on isolating and solving problems.

If the formatter is working successfully, you will see the following text displayed as the formatter *program* determines the type of fixed disk drive you have selected for formatting. In the following example, the RD32 is the disk being formatted.

```
VSfmt_STS_Siz ..... RD32
```

If you see the following error messages:

```
VSfmt_STS_Siz .....??
```

or

```
VSfmt_RES_Err # 2  
84 FAIL  
>>>
```

there is a problem with the fixed disk drive. Refer to the *VAXstation 2000 Owner's Manual*, Chapter 2 (Troubleshooting), for information on isolating and solving problems. If the drive is formatting properly, the following is displayed:

```
VSfmt_QUE_SerNbr (0-999999999) ?
```

4. Type in the serial number of the fixed disk and press RETURN. The serial number is located on the packing slip. If any letters appear in the serial number, do not type them in. Type in only the numbers. If you

do not have the serial number, you can assign a unique number for each fixed disk. Be sure to keep this unique number for future use. If you are formatting more than one fixed disk, each number must be unique.

The following text is displayed:

```
VSfmt_QUE_RUsure (DUAx 1/0) ?
```

5. Type the number 1 and press RETURN to tell the formatting program to continue. If for any reason you do not want to continue, type any number other than 1. If you do this, the formatter will stop and you will see the following message:

```
VSfmt_RES_Abtd  
84 FAIL  
>>>
```

If you choose to stop the formatter, you must restart at the first step of the formatting procedure when you are again ready to format a drive.

If you choose to continue, the following message is displayed gradually. It takes approximately 15 minutes to format an RD32 disk, 25 minutes to format an RD53 drive, and 40 minutes to format an RD54 drive.

```
VSfmt_STS_RdMbb .....OK  
VSfmt_STS_FMTing.....OK  
VSfmt_STS_ChkPsss.....OK  
VSfmt_STS_BBRvec := n  
VSfmt_RES_Succ  
>>>
```

If you see this message in its entirety, the disk has been successfully formatted and is ready for use.



If a problem occurs, one of the following two messages is displayed:

```
VSfmt_STS_Fmtng.....??  
VSfmt_RES_ERR #3  
84 FAIL  
>>>
```

or

```
VSfmt_STS_CkPss .....??  
VSfmt_RES_ERR #4  
84 FAIL  
>>>
```

If you see either of these messages, refer to the *VAXstation 2000 Owner's Manual*, Chapter 2 (Troubleshooting), for information on isolating and solving problems.

Before you install the operating system software, you should set the default boot device. Proceed to the next section, Set the Default Boot Device.



## Set the Default Boot Device

The default boot device should be set when you determine where the operating system software is to reside. The VAXstation 2000 then boots from that device at startup. The operating system software should reside in one of the following places:

- On a fixed disk in the system unit
- On a fixed disk in the expansion box
- On a remote system that you access through the ThinWire Ethernet

The default boot device should be set to one of these. Table 3 shows the names assigned to each of the possible devices. (There are other possible devices, but the devices listed are for storing *MicroVMS* workstation software and *ULTRIX* operating system software.)

**Table 3: Boot Device Names**

Device and Location	Device Name
Fixed disk in system unit	DUA0
Fixed disk in expansion box	DUA1
Diskette Drive	DUA2
Mass storage on remote system	ESA0
Tape	MUA0

To change the default boot device:

1. Check to be sure the system is in console mode. If the console prompt (>>>) does not appear on the screen, press the halt button on the rear of the VAXstation 2000 system unit.
2. At the console prompt, type **TEST 51**, then press RETURN.
3. Since no boot device has been selected yet, the following is displayed:

.... ? >>>

Type the name of the default boot device and press RETURN. Table 2 contains a list of default boot *device names*.

To change the default boot device to another device, type in the new boot device name and press RETURN. To change the default boot device back to no default boot device, type in a period (.) and press RETURN.

**Note:** If you type in a boot command, the defaults will not apply.

## Set the Default Boot Flags

The default boot flags should be set for the operating system installed on your VAXstation 2000. Consult your operating system documentation for MicroVMS and *ULTRIX* for more information.

To set the default boot flags:

1. Check to be sure the system is in console mode. If the console prompt (>>>) does not appear on the screen, press the halt button on the rear of the VAXstation 2000 system unit.
2. At the console prompt, type **TEST 52**, then press RETURN.
3. Set the default boot flags for the operating system that you have.



## Setting the Default Recovery

During manufacture, your system is set to automatically start up the operating system software every time you power up or in the event of an operating system software crash. To change this recovery action setting, follow these steps:

**Note:** Check your software documentation for shutdown procedures before halting your system.

1. Put the VAXstation 2000 in console mode by pressing the halt button on the rear of the system.
2. At the console prompt (>>>) type **TEST 53**, then press RETURN.

If the system is already set to reboot automatically, the following is displayed:

2 ? >>>

3. Press RETURN at the console prompt if you want to retain this setting.

If 3 is displayed instead of 2, your system is set to halt automatically after every power up. If you want to change from automatic halt to automatic reboot, type **2** at the console prompt and press RETURN. If you want to automatically RESTART should the system go down, type **1** at the console and press RETURN.

4. If you want your system to halt after every power up, type **3** at the console prompt and press RETURN.

In this case, your system will display the console prompt after every power-up sequence, and you must type **BOOT** (or **BOOT** followed by the device name of the device containing operating system software) every time you power up.

## Connecting ThinWire or Standard Ethernet

You can connect your VAXstation 2000 to a network either via ThinWire Ethernet or standard Ethernet.

After completing all the procedures in this guide, refer to the *Workstations and MicroVAX 2000 Network Guide* for information on installing ThinWire Ethernet.

## Where to Go from Here

### Install the Operating System Software

Before installing the operating system software, you should do the following:

1. Check with your system manager to be sure you need to install the operating system software on the fixed disk in your VAXstation 2000 system unit or expansion box. If you will be using the operating system on a *host system* through ThinWire Ethernet, you will not need to install the operating system software.
2. Properly format any fixed disks as instructed in Format the Fixed Disk.
3. Choose the default boot device as instructed in Set the Default Boot Device.
4. Read Chapter 1 (Operating the VAXstation 2000) in the *VAXstation 2000 Owner's Manual* to learn about system operation.
5. For systems using the ULTRIX operating system, be sure to set any printers for 7-bit ASCII. (Refer to the documentation that shipped with those devices.)

To install the MicroVMS or ULTRIX operating system software on the VAXstation 2000, follow the operating system software installation instructions that were shipped in the software carton. During the software installation, the operating system software is transferred from the installation media (tape cartridges or diskettes) to a fixed disk in the VAXstation 2000 or expansion box. If you use the tape cartridges or diskettes, you must have a tape drive or diskette drive installed on the VAXstation 2000.

You may also *down-line load* the operating system software from another VAXstation 2000 over the Ethernet network onto your fixed disk. For information about down-line loading the MicroVMS operating system software, refer to the *VAX/VMS Guide to Ethernet VAXclusters*. For information about down-line loading the ULTRIX operating system software,



refer to the *ULTRIX-32 Network Management Guide* and *ULTRIX-32 Basic Installation Guide for the VAXstation 2000*.

### **Related Documents**

For a list of related documents and their order numbers, see the *VAXstation 2000 Owner's Manual*, Appendix B (Related Documentation).

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## Glossary

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### **application program**

A program, such as a financial spreadsheet program, that performs an end-user task.

### **ASCII**

American Standard Code for Information Interchange. A set of 7- or 8-bit binary numbers representing the alphabet, punctuation, numerals, and other special symbols used in text representation and communications protocol.

### **backup copy**

A copy of data stored on your disk. The duplicate copy is stored on either RX33 diskettes or TK50 tape cartridges.

### **backup process**

The process of making copies of the data stored on your disk so that you can recover that data after an accidental loss. You make backup copies on RX33 diskettes, TK50 tape cartridges, or over a network.

### **baud rate**

The speed at which signals are serially transmitted along a communications line. One baud equals one bit/second.

### **binary**

A number system that uses two digits: 0 and 1. They are represented in system circuitry by two voltage levels, and programs are executed in binary form.

### **bit**

A binary digit; the smallest unit of information in a binary system of notation, designated as a 0 or a 1.

### **bitmap graphics**

The type of graphics supported by the VAXstation 2000. Bitmap graphics are defined by the workstation software and can individually set the shade of gray (or color) of each picture element (pixel) on the screen.

**boot**

See **bootstrap**.

**bootable medium**

A fixed disk, diskette, or magnetic tape cartridge containing software (such as an operating system) a bootstrap program can load into the system memory and execute.

**boot device**

The device that is booted at system startup. (See **bootstrap** and **device**.)

**bootstrap (or boot)**

To execute the bootstrap loader program, a program that is always resident in the system when the power is on. In the VAXstation 2000, this happens automatically whenever system power is turned on. The bootstrap loader loads the operating system software from a mass storage device and executes it. A bootstrap program.

**byte**

A group of eight binary digits (bits). A byte is one-quarter of a VAX system word.

**central processing unit (CPU)**

The part of the system that controls the interpretation and execution of instructions. In the VAXstation 2000, CPU functions are contained on one MicroVAX II CPU chip.

**cluster**

A group of computers networked together that share disk storage, application programs, and other computer resources.

**communications**

A cable along which electrical signals are transmitted. Devices or systems that are connected by a communications line can share information and resources.

**computer system**

A combination of system hardware, software, and external devices that performs operations and tasks.

**console mode**

The state in which the computer is controlled from the console terminal. The VAXstation 2000 can be put in console mode by pressing the halt button on the rear of the VAXstation 2000 system unit. Console mode is indicated by



the console prompt (>>>) on the monitor screen. The other mode the system can operate in is program mode. (See **program mode**.)

**console prompt**

A prompt used for communication between the system manager and the computer.

**controller**

A system component, usually a printed circuit board, that regulates the operation of one or more peripheral devices.

**CPU**

Abbreviation for central processing unit. (See **central processing unit**.)

**CRT (cathode ray tube)**

A vacuum tube that generates and guides electrons onto a fluorescent screen to produce characters or graphics. This term is often used to refer to a monitor.

**cursor**

A blinking line or figure on the screen that indicates where the next character the user types will appear.

**data**

A formal representation of information suitable for communication, interpretation, and processing by humans or computers.

**data transmission**

The movement of data in the form of electrical signals along a communications line.

**debug**

To detect, locate, and correct errors (bugs) in hardware or software.

**device**

The general name for any unit connected to the system that is capable of receiving, storing, or transmitting data. (See **input/output (I/O) device** and **controller**.)

**device icon**

An icon on the back of the VAXstation 2000 that shows the device that can be plugged into the connector.

**device name**

The name by which a device or controller is identified in the system. Use that name to refer to that device when you are communicating with the system.

**diagnostics**

Programs that detect and identify abnormal system hardware operation. The diagnostics for the VAXstation 2000 is located in read-only memory. (See **read-only memory**.)

**disk**

A flat circular plate with a coating on which data is magnetically stored in concentric circles (tracks). A fixed disk resides permanently inside a disk drive, while a diskette is removable.

**disk drive**

A device that holds a disk. The drive contains mechanical components that spin the disk and move the read/write heads that store and read information on the surface of the disk.

**diskette**

A flexible, "floppy" disk contained in a square jacket. Diskettes can be inserted and removed from diskette drives.

**diskette drive**

A disk drive that only reads or writes on removable diskettes.

**dot matrix**

A method of generating characters for printing that uses dots to produce readable characters.

**down-line load**

To send a copy of a system image or other file over a line to the memory of a target node.

**error message**

A message displayed by a system to indicate a mistake or malfunction.

**Ethernet**

A type of local area network based on Carrier Sense Multiple Access with Collision Detection (CSMA/CD).

**file**

A collection of related information treated by the system as a single unit.



**fixed disk**

See **disk**.

**format**

To prepare a diskette to accept data.

**formatted data**

Data that is structured in a particular pattern to be understood by the system software.

**GKS**

Graphics Kernel System. GKS acts as one of the graphics interfaces for the VAXstation 2000. GKS is an international standard for graphics applications that run on many different devices and equipment.

**hard-copy terminal**

A terminal that displays information on paper. Compare to Video terminal.

**hardware**

The physical components—mechanical and electrical—that make up a system. Compare to Software.

**head**

The part of a fixed disk drive, diskette drive, or tape drive that reads, records, and erases data. Also called read/write head.

**host system**

The primary or controlling computer in a multiple computer network.

**icon**

A graphic symbol that gives a visual image of a device or a procedure's function. Icons often appear on the system's enclosure to aid the user in locating connectors and controls. On a workstation, a graphic symbol displayed on a monitor or terminal screen, which represents a window or action. A window may be shrunk to an icon.

**input/output (I/O) device**

A piece of equipment that accepts data for transmission to (input) and from (output) the system. For example, a terminal.

**interactive**

A method of communicating with the system. In an interactive session, you type a command at the keyboard and the system executes the command and responds with a prompt character for another command.

**interface**

A device or piece of software that allows the components of the system to communicate with each other.

**I/O**

Abbreviation for input/output. (See **input/output (I/O) device**.)

**K**

The symbol that means 2 to the 10th power (or 1024 in decimal notation). Also, an abbreviation for kilo (thousand).

**kilobyte**

1024 bytes.

**LED**

Light-emitting diode. LEDs are used as indicators on the system enclosure.

**load**

To copy software (usually from a peripheral device) to memory. To physically place a disk in a disk drive or a tape in a tape drive.

**local area network (LAN)**

A data communications system designed for a small geographic area that offers high-speed communications channels optimized for connecting information-processing equipment. For example, ThinWire Ethernet.

**M**

The symbol for 1024 squared (1,048,576 in decimal notation). Also, an abbreviation for mega (million).

**magnetic tape**

A tape used for storing data that is made of plastic and coated with magnetic oxide. Also called magtape.

**megabyte**

1,048,576 bytes.



**memory**

The area of the system that electrically stores instructions and data, often temporarily.

**memory module**

A printed circuit board that contains additional memory for the system.

**MicroVMS**

The VAX/VMS operating system software. This operating system is specifically designed for MicroVAX-based systems.

**MicroVMS workstation software**

Window management software for a MicroVAX-based system. The system must run MicroVMS as the operating system. Workstation software allows you to control and view several programs on one screen. You specify the window with which to interact by using a pointing device, such as a mouse.

**module**

A printed circuit board that contains electrical components and electrically conductive pathways between components. A module stores data or memory or controls the functions of a device. (See **printed circuit board**.)

**mouse**

A relative-positioning input device that is rolled across the desktop to move the pointer or mouse cursor on the monitor screen and is used to select menu options and draw graphics. The mouse is palm sized and contains three buttons (function keys) and a ball bearing.

**network**

A group of individual computer systems that are connected by communications lines to share information and resources.

**node**

An individual information-processing unit, such as a computer, workstation, or peripheral device, that is connected to a network.

**off-line**

Pertaining to equipment, devices, and events that are not controlled by the system, or have been logically disconnected from the system.

**on-line**

Pertaining to equipment, devices, and events that communicate with the system.

**operating system**

A collection of system programs that controls the operation of the system and allows the user access to data files, input/output devices, and applications programs. The operating system software performs such tasks as assigning memory to programs and data, processing requests, and scheduling jobs. MicroVMS and ULTRIX are the two operating systems offered for the VAXstation 2000.

**output device**

A device that accepts data from the system. A printer is an example of an output device.

**peripheral device**

A device that provides the CPU with additional memory storage or communication capability. Examples are disk and diskette drives, video terminals, and printers.

**plotter**

A device to construct visual representations of data by an automatic pen or pencil. Plotters can also receive plotting coordinates from digital computers.

**pointing device**

A terminal input device that allows you to make a selection from a menu or to draw graphics. (See **mouse** and **tablet**.)

**port**

The name of the socket or connector at the back of the computer to which a terminal, printer, or other communication devices are connected.

**power-up sequence (power up)**

A series of ordered events that occur when you supply power by turning on the system.

**printed circuit board**

A piece of fiberglass board used to make modules. (See **module**.)

**printer**

A peripheral device that provides paper copies of information stored on the system.

**program**

The sequence of instructions the system uses to perform a task. (See **software**.)



**program mode**

The state in which the computer is controlled by the operating system. After the operating system is installed, the system will always operate in program mode, unless you put it into console mode. (See **console mode**.)

**prompt**

Words or characters that the system displays to indicate that it is waiting for you to type a command.

**puck**

A palm-sized device that slides on the tablet's surface and together function as a pointing device. (See **pointing device** and **tablet**.)

**RAM**

Abbreviation for random-access memory. (See **random-access memory (RAM)**.)

**random-access memory (RAM)**

Memory that can be both read and written into and randomly access any one location during normal operations. The type of memory the system uses to store the instructions of programs currently being run.

**raster**

A linear measurement unit for graphics characters on the video screen.

**read-only memory (ROM)**

A memory whose contents cannot be modified. The system can use the data contained in a ROM but cannot change it.

**remote install**

See **down-line load**.

**ROM**

Abbreviation for read-only memory. (See **read-only memory (ROM)**.)

**run**

A single continuous execution of a program (noun). To execute a program (verb).

**software**

Programs executed by the system to perform a chosen or required function. Compare to Hardware.

**storage medium**

Any device capable of recording information; for example, a diskette.

**store**

To enter data into a storage device, such as a disk, or into memory.

**stylus**

A penlike device that draws on the tablet's surface and together function as a pointing device. (See **pointing device** and **tablet**.)

**system**

A combination of system hardware, software, and peripheral devices that performs specific processing operations.

**system image**

The image that is read into memory from disk when the system is started up (booted).

**system management tasks**

Tasks performed by an assigned person to operate and maintain the system. That person is usually the system manager.

**tablet**

An absolute-positioning input device composed of a flat-surfaced digitizing tablet, a puck, and a stylus. The tablet is a drawing surface. The puck and stylus are pointing devices that move the cursor on the monitor screen, draw graphics, and make selections from the menu.

**tape drive**

A device that contains mechanical components and holds, turns, reads, and writes on magnetic tape.

**T-connector**

Connector used to join ThinWire Ethernet cable sections. The connector also has a connector that is attached directly to a station.

**terminal**

An input/output device that allows you to communicate with the system. Terminals are divided into two categories: video and hard-copy.

**terminator**

A special connector used on one or both ends of an Ethernet segment that provides the 50-ohm termination resistance needed for the cable.



**text cursor**

A block or line, usually blinking, displayed on a CRT screen to indicate where the next character typed will appear.

**ThinWire**

A DIGITAL trademark used to describe its 10base2 (IEEE standard 802.3 compliant) Ethernet products used for local distribution of data.

**ThinWire Connector**

The connector on the rear of the VAXstation 2000 system unit to which the ThinWire Ethernet cable is attached.

**32-bit length**

The length of the internal data path of the CPU. This length provides more concentrated data, allows more data types, and enables more data to be transferred at one time than a 16-bit internal data path.

**ULTRIX-32w**

The window management software for a MicroVAX-based system. The system must run ULTRIX-32m as the operating system. Workstation software allows you to control and view several programs on one screen. You specify the window with which to interact by using a pointing device.

**user command**

An order you give to the system through a keyboard, mouse, or other input device.

**user input device**

A piece of equipment that is used to transfer data to the system. For example, keyboard, disk, tape, and system are input devices.

**video terminal**

A terminal that displays information on the screen of a cathode ray tube (CRT). Compare to Hard-copy terminal.

**VLSI**

Very Large Scale Integration of integrated circuit chips. A large number of chips can fit on a printed circuit board; therefore, fewer boards are needed, and the system can be smaller.

**Winchester disk**

A hard disk permanently sealed in a drive unit to prevent contaminants from affecting the read/write head. The sealed head/disk assembly (HDA) helps to increase drive reliability and ensure data integrity. (See **fixed disk**.)

**window**

An area on your monitor screen in which you can start, run, and view a separate process. Windowing is supported by both MicroVMS and ULTRIX workstation software.

**word**

The largest number of bits (32) that the VAXstation 2000 system can handle in an operation. These systems can also handle longwords (that is, two words or 64 bits).

**workstation**

A single-user system that offers high-performance, high-resolution graphics, and can function in a network environment.

**write-protect**

To protect a disk, diskette, or other storage medium from the addition, revision, or deletion of information.

**write-protect notch**

The small notch on the side of an RX33 or RX50 diskette that you can cover with an adhesive-backed foil label or tab to prevent loss of data by accidental overwriting.

**write-protect switch**

The switch that you slide down on a TK50 tape cartridge to prevent loss of data by accidental overwriting.



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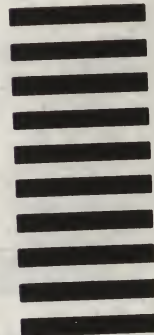
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